HANDS OFF MY STAFF!

Aggressive online recruiters can find anyone on your staff they want. Here's how to stop them. Page 50

DOWNTURN-PROOFED

Columnist Ed Yourdon offers some survival tips for your IT projects if a recession hits. Page 41

INFO ARCHITECTS

They're the Web's new master builders, charged with guiding users' experiences on your site. Page 71

COMPUTERWORLD

THE NEWSPAPER FOR IT LEADERS • WWW.COMPUTERWORLD.COM

JANUARY 22, 2001 • VOL. 35 • NO. 4 • $5/COPY

MANUELLO PAGANELLI

INFO WARRIORS

THE PENTAGON WORRIES THE MOST ABOUT a cyberattack that could cripple the U.S. information infrastructure, but Deborah Radcliff reports that it's the private sector that needs to actually do something about it. Why? Because the targets are likely to be utilities, telcos, banks and other economic nerve centers that are outside the military's control.

Stories begin on page 44.

BUSH EXPECTED TO RATTLE FEDERAL IT

Players in new administration are fond of centralization, outsourcing, e-government

BY PATRICK THIBODEAU
WASHINGTON

FEDERAL CIOs

As if it were a hostile takeover, the inauguration of a new president brings federal CIOs a lot of uncertainties about their work and jobs. But while most federal IT managers have some civil service job protections, they will want to do more than merely survive in their positions — they hope for more responsibility in the new administration.

"It all comes down to this: Does your new boss like you or not?" said Roger Baker, CIO at the U.S. Department of Commerce, who worked in the private sector before taking the federal job two years ago. His new boss will be Donald Evans, the Commerce secretary-designate.

"You've got to make sure you're on his team, that he understands what you are all about and that you can add value to the organization," said Baker. "In the end, he's got to decide that you're the person he wants in the job, not that he inherited you."

Federal CIOs say they expect President George W. Bush to bring significant changes to the $40 billion federal IT operation, including expanded online government initiatives, a move toward centralized control of IT management through a federal CIO, and cross-agency initiatives — the sharing of IT resources affecting everything from application development to help desk operations.

"Hopefully, it's going to be a more structured, more connected organization," said George Molaski, CIO at the Department of Transportation.

Federal IT, page 14

Bipartisan Outsourcing?

The federal government spent $2.5B last year on IT outsourcing out of a total federal IT budget of nearly $40B. Federal IT outsourcing is expected to grow at 7.3% annually to $3.6B by 2005. That estimate was made by market research firm Input before Bush's election, but the firm is sticking with it because of the generally bipartisan support for contracting IT services, said Kevin Plexco, a vice president at Chantilly, Va.-based Input.

REPORT: NET RISKS ON RISE IN CHINA

Yet U.S. firms there see no cause for concern

BY DAN VERTON

Intelligence and security experts are warning foreign firms in China of a growing threat of Internet-related crimes, government surveillance and loss of proprietary data. But some U.S. companies said they view those threats as exaggerated.

The latest warning comes from a report published last month by a network security firm founded by two former U.S. Navy intelligence officers. The report, released by Dublin, Ohio-based LogiKeep Inc., cautions companies that the government-controlled Internet environment in China could put the integrity of their networks at risk.

"The most important consideration is that, in one way or another, the government is involved in the operation, regulation and monitoring of the country's networks," states the report, "The People's Republic of China: A Network Security Threat Assessment." As a result of this and other factors, such as tensions with Taiwan, "U.S. companies could see an increase in scans, probes and attacks" that could be aimed at

China, page 81

LAYOFFS REIGNITE CALL FOR UNIONS

Job security an issue for dot-com workers

BY JULEKHA DASH

As more Web-related firms dismiss technology workers each week, the time may finally be ripe for IT unions, according to labor officials.

Nationwide, job cuts at Internet firms rose almost 20% from November to December, to a total of 19,248 for both months, according to Chicago-based outplacement firm Challenger, Gray & Christmas Inc. Just last week, Cable News Network, an Atlanta-based unit of the newly formed AOL Time Warner Inc., laid off 400 employees, one-third of whom were online staffers.

"The sooner people band together for mutual relief, the better they are facing things like layoffs," said Erin Poh, a representative of the Northern California Media Workers Guild, which is working to organize a union at San Francisco-based online consumer-electronics firm Etown.com.

But critics argued that in spite of the economic down-

Unions, page 16

Getting Organized

Attempts to organize technology workers:

Company: Etown.com
Union: Northern California Media Workers Guild

Companies: Microsoft, Amazon.com
Union: Washington Alliance of Technology Workers

NEWSPAPER
[illegible]CAR-RT LOT[illegible]-052
[illegible] OCT 01 001 10039
U M I 125
U M I
PO BOX 904 39-4
ANN ARBOR MI 48106-0904

PUTTING LIFE IN YOUR E-MAIL

LifeFX, a small company in suburban Boston, specializes in uncannily lifelike 3-D human images. Page 61

THE WEB'S MASTER BUILDERS

Information architects who guide a user's experience through a Web site are becoming the key IT professionals charged with turning a functional Web site into a truly useful one. Page 71

COMPUTERWORLD THIS WEEK

JANUARY 22, 2001

NEWS 6

6 MACROMEDIA SPENDS $360M to acquire Allaire, as the merged company faces the challenge of .Net.

6 ORACLE TOUTS three new B2B products, but some users are skeptical about reliability.

7 FEDS ISSUE financial service security rules as "guidelines," giving flexibility to private companies in meeting the requirements to protect customer data.

7 THE GAO WARNS that the government's information security program isn't keeping pace with growing threats.

8 BMW ENTERS the telematics space by adding voice-activated and Web-enabled phones to its cars.

10 LOTUS PUSHES knowledge management at its Lotusphere 2001 conference, while users swap advice on migration to Notes R5.

12 TRAVELOCITY PREDICTS it will be profitable by the end of the second quarter — six months ahead of schedule.

12 JOHNSON CONTROLS launches an exchange for its automotive suppliers, taking on the Big Three automakers' Covisint exchange.

MORE

BUSINESS 39

40 SHIPPERS SWEAR BY a new marketplace that aims to tie together the disparate transportation industry.

40 TRADERS DEBATE the value of Nasdaq's newly approved trading system, SuperMontage.

WORKSTYLES

41 CAMBRIDGE INCUBATOR makes sure its IT department is flexible enough to support a variety of companies' infrastructures on short notice.

44 CYBERTHREATS KEEP the Critical Infrastructure Assurance Office on constant guard.

50 EMPLOYERS CAN GUARD their top talent by learning to beat pushy recruiters at their own game.

QUICKSTUDY

53 SERVICE-LEVEL agreements can help navigate the way to an effective ASP contract.

TECHNOLOGY 57

SECURITY JOURNAL

59 JUDE THADDEUS ponders how his company should adapt to surveillance laws.

EXEC TECH

60 HIGH-TECH GADGETS compete for the attention of reviews editor Russell Kay at the Consumer Electronics Show.

62 EXCHANGE 2000 Server delivers major improvements over its predecessor, but the upgrade path may be steep.

66 EFFECTIVE STORAGE management remains an elusive goal despite new software tools.

QUICKSTUDY

68 COMPUTERS NEED HELP to understand English or even programming languages — that's where compilers, interpreters and byte code come in.

EMERGING COMPANIES

70 BLACKSTONE Technology cultivates compute farms to make high-end processing power available.

ONLINE

A panel of experts dissects a failed dot-com and discusses whether there was anything that could have been done to save the company. Check out this new feature in our **E-Commerce Community** at *www.computerworld.com/ecommerce*

Also in the **E-Commerce Community** Xchange Inc. CFO **Andy Frawley** considers whether CRM has lived up to its promise. *www.computerworld.com/ecommerce*

Check out the latest version of Computerworld Mobile for your handheld device. New features include the ability to select a specific topic for stories that are sent to your customized news, and the ability to save stories in a device indefinitely — even after channel content is updated. Sign up at *www.computerworld.com/mobile*.

OPINIONS

32 MARYFRAN JOHNSON writes that IT leaders must shift into a global mind-set to help their companies succeed on a worldwide basis.

32 PIMM FOX says he believes that ERP could be a technological solution to the power crisis that's gripping California.

33 JOHN GANTZ offers advice for choosing an application service provider, as that market changes.

36 DON TAPSCOTT says George W. Bush can carve out a place in history by using IT to widen democracy.

36 WILLIAM M. ULRICH has some suggestions for companies in managing their "information ecosystems," IT environments that interact with other organizations.

41 ED YOURDON offers advice to help keep projects funded and morale up during the economic downturn we may be facing.

82 FRANK HAYES says IT organizations must take the proper steps to stop thrill-seeking teen-agers from hacking corporate Web sites.

AT DEADLINE

Sandia Labs Plans New Supercomputer

The U.S. Department of Energy said last week that its Sandia National Laboratories in New Mexico is teaming up with Compaq Computer Corp. and Celera Genomics Group, a biotechnology firm in Rockville, Md., to develop a supercomputer. The box is supposed to be capable of processing 100 trillion operations per second. It will be based on future versions of Compaq's AlphaServer SC supercomputer line. A prototype isn't expected until 2004.

ACLU Wants Hearings On Top-Level Domains

The American Civil Liberties Union and several other groups championing "cyberrights" last week sent a letter to the U.S. Department of Commerce criticizing the planned addition of seven new top-level Internet domains. The letter argued that the Marina del Rey, Calif.-based Internet Corporation for Assigned Names and Numbers placed artificial limits on the number of new domains and asked for a hearing.

AOL Gives Sun More Business

America Online Inc. last week said it will purchase $400 million worth of Sun Microsystems Inc. equipment during the next two years to meet the needs of more than 26 million AOL members, 2.8 million CompuServe Corp. members and millions of users of other AOL-owned brands. That means that Dulles, Va.-based AOL has committed to spending $900 million on Sun equipment to date. Meanwhile, Sun announced its second-quarter results, saying net income rose 58% from the same period a year earlier to $552 million.

Topaz Beta Progresses

Microsoft Corp. last week announced that its Systems Management Server, code-named Topaz, will be released for initial beta-testing in the second half of this year. A new complementary application, Microsoft Operations Manager, is scheduled for beta-testing in the first quarter.

Oracle Users Cautious About 'E-Hub' Strategy

Some skeptical about product reliability

BY MARC L. SONGINI

Users may benefit from Oracle Corp.'s road map that was announced last week to create a centralized, integrated marketplace infrastructure, analysts said. But first, the software giant will have to convince at least some of its customers that the products underlying this framework are reliable enough for them to buy into the plan.

Last week, the company announced plans to introduce three marketplace-related supply-chain, logistics and application development software. More important, it began to elaborate on its so-called e-hub strategy, first announced late last year. The e-hub model, say Oracle executives, is designed to let enterprise customers create a single data-formatting and -sharing infrastructure for all applications connected to the Oracle marketplace.

The e-hub will enable companies to bolt legacy applications and new software onto the marketplace and use the existing system without major development efforts, said Mark Jarvis, chief marketing officer at Oracle. "Customers should not have to do software integration. The software company should," he said.

Something to Prove

However, a large number of users are still hashing through problems from implementing Oracle's recently released E-Business Suite 11i software.

The new marketplace applications have no appeal at Eaton Corp., an $8.4 billion industrial manufacturer.

"From an Eaton perspective, they are not even on our radar screen," said John Schindler, program manager for IT. "Until Oracle gets their 11i release of the applications stable and working, we are not considering looking at or discussing anything from Oracle, no matter what the sales and marketing folks have to say."

"In concept, [the e-hub is] a great idea," said Karen Gilbert, an Oracle Applications User Group board member who works at Dallas-based consulting firm Computer Systems Authority. "But Oracle is going to have to prove it works, and that it works without an Oracle developer sitting at the customer site doing all the implementation."

There are also other potential downsides, she noted. For instance, a failure in one part of the e-hub could crash the whole infrastructure. It also means that all upgrades have to be conducted systemwide.

Nevertheless, some observers said Oracle is working to make life easier for enterprise users. Instead of designing point-to-point integration systems with specific transactions for each business process, e-hub is expected to let users create one central infrastructure that will handle data translation and routing, said John Fontanella, an analyst for business-to-business marketplaces at AMR Research Inc. in Boston.

"Without the framework and the basic integration components, their business-to-business is going nowhere," he said.

While other major companies such as IBM and San Jose-based BEA Systems Inc. are also formulating development, integration and collaboration framework strategies, Oracle's presence should "move things ahead quicker," Fontanella said. He added that Oracle is flexible about which vendors' applications are used on top of the e-hub. ◗

The Power of Three

Oracle last week announced three new products:

Supply Chain Exchange, promises to let companies have more flexibility in interactions with suppliers

Transportation Exchange, promises to let users dynamically buy logistics services from suppliers as needed

Product Development Exchange, promises to let companies collaborate with suppliers online when designing new products

Customers Optimistic After Macromedia/Allaire Merger

BY LEE COPELAND

In a $360 million cash-and-stock swap, Macromedia Inc. last week acquired Allaire Corp., making a legal union of what many developers called a common-law marriage of the firms' Web site design and back-end application development tools.

San Francisco-based Macromedia said it hopes the merger will boost its Web design tools, such as its popular Flash animation software, by integrating with Allaire's application development tools. Developers and analysts lauded the merger, which could also better the merged firm's competitive position against rival Microsoft Corp.

"This is a chance for Macromedia to improve its products by extending the server-side [functionality]," said Jaro von Flocken, CEO of New Image Ltd., a Web design start-up in Berlin. "This is an important issue because most big enterprises use a database engine on the back end of their Web site and Macromedia doesn't support that."

Newton, Mass.-based Allaire makes two application development servers: ColdFusion, a cross-platform product that runs both Microsoft's Active Server Pages and JavaServer Pages, and Java-based JRun. After the merger, Macromedia will add Java 2 Enterprise Edition compliance to ColdFusion and link its other design tools to both application servers.

"A lot of people used [free] alternate scripting languages to incorporate the various products that Macromedia sells with a database," said William Thomson, CEO at Obsidian-Studios Inc., a multimedia development firm in Petaluma, Calif. "Hopefully, now we will get some support or documentation."

Randy Covill, an analyst at AMR Research Inc. in Boston, said a lack of back-end support for extracting, transforming and loading Web data has been a problem for Macromedia. "It's very awkward to live without it, and [its lack of support] undermines productivity," he said.

Developers also said the merger and its product integration goals could keep Macromedia competitive against Microsoft, which makes a unified tool set that ties in both front-end and back-end development tools with its Internet Explorer browser.

Integrating products should give "developers more control and power over the back end," said John Foulds, a developer at Filament Communications Inc., a Web development firm in Ottawa. "With Microsoft [tools], you have more enterprise projects with big budgets, but with [this] merger, they can do the lower end of the market." ◗

Postmerger Goals

Macromedia will focus on integration with tools from Allaire to:

- Make Allaire's ColdFusion **compatible with** Java 2 Enterprise Edition
- **Integrate** Allaire's HomeSite and Macromedia's Dreamweaver
- Deliver new free components, code-named Harpoon, that tie **Macromedia's Flash** with Allaire's JRun and ColdFusion application server development tools

Feds Set Financial Security 'Guidelines'

Firms asked to assess risks, say how they will be addressed

BY PATRICK THIBODEAU
WASHINGTON

Federal banking regulators last week issued a long-awaited set of information security procedures for financial services firms and are calling them flexible "guidelines" rather than strict regulations. But the rules, which are aimed at protecting customer data, drew a mixed response upon their release.

The rules are due to take effect in July. But because they're designated as guidelines, companies aren't required to follow certain procedures and can adopt security practices and technologies that they think work best, said John Byrne, senior counsel at the American Bankers Association in Washington.

But Randal Baker, a vice president and compliance officer at Marathon National Bank in Los Angeles, said bank examiners can be tough about making sure that companies follow guidelines. "Unfortunately, experience has taught me when an examiner comes, the guidelines suddenly take on a new meaning — 'guidelines are meant to be followed' is the kind of the attitude," he said.

And the guidelines aren't likely to end regulatory threats on the customer-privacy issue for financial service companies, said Bill Bradway, an analyst at Meridien Research Inc. in Newton, Mass.

[illegible]

Firms will still "have to prepare for a playing field where the rules are subject to change on the fly," particularly in regard to security and privacy, Bradway said.

The guidelines, required under the sweeping Gramm-Leach-Bliley financial deregulation legislation that became law in 1999, call on companies in the financial services industry to prepare assessments of data security risks along with written plans for controlling those risks. They also require firms to continually adjust their plans to account for changes in technology.

Last fall, executives at affected banks, brokerages and insurance companies said mandating stringent security requirements, such as encrypting stored or transferred data, would increase costs and potentially impair data-sharing arrangements with business partners.

Byrne said banks and financial services companies had also urged federal regulators in written comments received last August to give them flexibility in providing administrative, technical and physical safeguards for customer records and information in order to avoid being saddled with a "one-size-fits-all" set of rules.

"I think the agencies did a fine job of assessing what the situation is out there regarding information security," said Byrne, adding, "These [guidelines] could have been a lot worse than they are." ▶

The Rules

The security guidelines asks financial services firms to have administrative, technical and physical safeguards for customer records and information. Companies will be asked to take the following steps:

- **Risk assessment:** Identify and assess risks.
- **Put it in writing:** Policies and procedures for controlling risk are required.
- **Update:** Keep pace with technology and threats.
- **Make sure it works:** Implement and test the plan.

[illegible]

Bush Faces His First Privacy Challenge

Proposals from industry, advocates differ

BY TODD R. WEISS

George W. Bush has been president since only Saturday, but there's already a battle brewing for his attention between groups wanting federal regulations for online privacy.

In a letter sent last week to Bush, congressional leaders and various other federal and state government officials, a group of 17 organizations ranging from the Chicago-based American Library Association to the Electronic Privacy Information Center (EPIC), proposed a privacy-protection framework that they they hope will be enacted early this year.

The proposal by Washington-based EPIC and its allies coincides — and potentially conflicts — with another proposal made last week by the American Electronics Association (AEA). The technology industry trade group listed eight privacy principles it wants Congress to consider as it mulls privacy-related legislation.

Among the steps that EPIC and its supporters are seeking is the implementation and enforcement of so-called Fair Information Practices, which would require companies to give individuals access to the personal information collected by Web sites. The supporters also proposed that Internet users be given the ability to correct erroneous information and to limit the use of the data that companies gather.

The groups are also asking for the creation of a special commission to address privacy issues as they arise. The framework would limit new surveillance technologies and allow each state to develop its own laws, which could include potentially broader protections than federal regulations would provide.

But such controls are seen as overkill by trade groups such as the AEA. The Washington-based group has reversed its earlier position, saying it's now willing to accept federal privacy legislation but is lobbying Congress to be sure that federal laws would preempt any state privacy laws.

The AEA does favor provisions for Internet users to have "opt-out" mechanisms, which prevent any information users provide to a company from being used for purposes other than those that have been specified up front.

Jason Catlett, president of Junkbusters Corp., a privacy firm in Green Brook, N.J., and one of the groups that joined the EPIC letter, said the AEA approach is weak. "The principles that they're recommending to Congress have more to do with preventing privacy than providing it," he said.

But AEA spokesman Marc Brailov defended the trade group's proposal as the best way to protect both individual Internet users and e-commerce businesses without saddling the latter group with excessive regulations. "Our approach is balanced and reasoned," he said. ▶

BRIEFS

FBI Closes Los Alamos Hard-Drive Case

The FBI last week ended a seven-month criminal investigation at the Los Alamos National Laboratory in New Mexico that looked into the temporary disappearance of two computer hard drives containing nuclear weapons secrets. It was unable to determine responsibility for the disappearance and found no evidence that the classified information contained on the hard drives last been compromised. The drives were missing for 11 days last June but were later found behind a photocopier.

Linux Worm Spreads

An Internet worm called Ramen is spreading across Linux-based servers running Durham, N.C.-based Red Hat Inc.'s version of the open-source operating system. It hasn't caused much damage yet, but some observers said they're worried that the self-replicating program – which advises recipients in e-mail to "eat your Ramen," referring to the noodle soup – could ultimately cause damage to Web sites and home pages.

Possible China Link In Microsoft Break-in

New evidence has emerged that the QAZ worm reportedly used to break into Microsoft Corp.'s networks in October communicated with an e-mail account in China. Microsoft hasn't confirmed that the QAZ worm was even involved in the network intrusion, which was discovered in October and reported to the FBI. But a report issued by security consulting firm LogiKeep Inc. in Dublin, Ohio, said QAZ communicated with an e-mail account in Beijing.

'Mafiaboy' Pleads Guilty

The teen-age computer hacker known as Mafiaboy pleaded guilty last week to 55 of 66 counts of mischief in connection with last year's denial-of-service attacks that crippled several major Web sites. The attack brought down the Web sites of CNN.com, Yahoo Inc., Amazon.com Inc., eBay Inc. and others last February. The boy last previously pleaded not guilty to all charges.

Feds Set Financial Security 'Guidelines'

Firms asked to assess risks, say how they will be addressed

BY PATRICK THIBODEAU
WASHINGTON

Federal banking regulators last week issued a long-awaited set of information security procedures for financial services firms and are calling them flexible "guidelines" rather than strict regulations. But the rules, which are aimed at protecting customer data, drew a mixed response upon their release.

The rules are due to take effect in July. But because they're designated as guidelines, companies aren't required to follow certain procedures and can adopt security practices and technologies that they think work best, said John Byrne, senior counsel at the American Bankers Association in Washington.

But Randal Baker, a vice president and compliance officer at Marathon National Bank in Los Angeles, said bank examiners can be tough about making sure that companies follow guidelines. "Unfortunately, experience has taught me when an examiner comes, the guidelines suddenly take on a new meaning — 'guidelines are meant to be followed' is the kind of the attitude," he said.

And the guidelines aren't likely to end regulatory threats on the customer-privacy issue for financial service companies, said Bill Bradway, an analyst at Meridien Research Inc. in Newton, Mass.

Firms will still "have to prepare for a playing field where the rules are subject to change on the fly," particularly in regard to security and privacy, Bradway said.

The guidelines, required under the sweeping Gramm-Leach-Bliley financial deregulation legislation that became law in 1999, call on companies in the financial services industry to prepare assessments of data security risks along with written plans for controlling those risks. They also require firms to continually adjust their plans to account for changes in technology.

Last fall, executives at affected banks, brokerages and insurance companies said mandating stringent security requirements, such as encrypting stored or transferred data, would increase costs and potentially impair data-sharing arrangements with business partners.

Byrne said banks and financial services companies had also urged federal regulators in written comments received last August to give them flexibility in providing administrative, technical and physical safeguards for customer records and information in order to avoid being saddled with a "one-size-fits-all" set of rules.

"I think the agencies did a fine job of assessing what the situation is out there regarding information security," said Byrne, adding, "These [guidelines] could have been a lot worse than they are." ◼

MORE ONLINE For complete security news, visit our security community at: www.computerworld.com/security

The Rules

The security guidelines asks financial services firms to have administrative, technical and physical safeguards for customer records and information. Companies will be asked to take the following steps:

- ▸**Risk assessment:** Identify and assess risks.
- ▸**Put it in writing:** Policies and procedures for controlling risk are required.
- ▸**Update:** Keep pace with technology and threats.
- ▸**Make sure it works:** Implement and test the plan

Feds Still Lag On Security

Federal agencies aren't keeping pace with the growing information security threat, and government systems "continue to be vulnerable to disruptions, data tampering, fraud and inappropriate disclosure," according the U.S. General Accounting Office (GAO) in its annual report of "high-risk" government programs.

Citing a general increase in incidents and the damage caused by last May's "I Love You" virus, the GAO said information security at federal agencies "continued to be fraught" with weaknesses.

The GAO said audits continue to show that many agencies haven't developed security plans for major systems, documented their security policies or implemented a program for testing and evaluating the effectiveness of existing security programs.

– Patrick Thibodeau

Bush Faces His First Privacy Challenge

Proposals from industry, advocates differ

BY TODD R. WEISS

George W. Bush has been president since only Saturday, but there's already a battle brewing for his attention between groups wanting federal regulations for online privacy.

In a letter sent last week to Bush, congressional leaders and various other federal and state government officials, a group of 17 organizations ranging from the Chicago-based American Library Association to the Electronic Privacy Information Center (EPIC), proposed a privacy-protection framework that they they hope will be enacted early this year.

The proposal by Washington-based EPIC and its allies coincides — and potentially conflicts — with another proposal made last week by the American Electronics Association (AEA). The technology industry trade group listed eight privacy principles it wants Congress to consider as it mulls privacy-related legislation.

Among the steps that EPIC and its supporters are seeking is the implementation and enforcement of so-called Fair Information Practices, which would require companies to give individuals access to the personal information collected by Web sites. The supporters also proposed that Internet users be given the ability to correct erroneous information and to limit the use of the data that companies gather.

The groups are also asking for the creation of a special commission to address privacy issues as they arise. The framework would limit new surveillance technologies and allow each state to develop its own laws, which could include potentially broader protections than federal regulations would provide.

But such controls are seen as overkill by trade groups such as the AEA. The Washington-based group has reversed its earlier position, saying it's now willing to accept federal privacy legislation but is lobbying Congress to be sure that federal laws would preempt any state privacy laws.

The AEA does favor provisions for Internet users to have "opt-out" mechanisms, which prevent any information users provide to a company from being used for purposes other than those that have been specified up front.

Jason Catlett, president of Junkbusters Corp., a privacy firm in Green Brook, N.J., and one of the groups that joined the EPIC letter, said the AEA approach is weak. "The principles that they're recommending to Congress have more to do with preventing privacy than providing it," he said.

But AEA spokesman Marc Brailov defended the trade group's proposal as the best way to protect both individual Internet users and e-commerce businesses without saddling the latter group with excessive regulations. "Our approach is balanced and reasoned," he said. ◼

BRIEFS

FBI Closes Los Alamos Hard-Drive Case

The FBI last week ended a seven-month criminal investigation at the Los Alamos National Laboratory in New Mexico that looked into the temporary disappearance of two computer hard drives containing nuclear weapons secrets. It was unable to determine responsibility for the disappearance and found no evidence that the classified information contained on the hard drives had been compromised. The drives were missing for 11 days last June but were later found behind a photocopier.

Linux Worm Spreads

An Internet worm called Ramen is spreading across Linux-based servers running Durham, N.C.-based Red Hat Inc.'s version of the open-source operating system. It hasn't caused much damage yet, but some observers said they're worried that the self-replicating program – which advises recipients in e-mail to "eat your Ramen," referring to the noodle soup – could ultimately cause damage to Web sites and home pages.

Possible China Link In Microsoft Break-in

New evidence has emerged that the QAZ worm reportedly used to break into Microsoft Corp.'s networks in October communicated with an e-mail account in China. Microsoft hasn't confirmed that the QAZ worm was even involved in the network intrusion, which was discovered in October and reported to the FBI. But a report issued by security consulting firm LogiKeep Inc. in Dublin, Ohio, said QAZ communicated with an e-mail account in Beijing.

'Mafiaboy' Pleads Guilty

The teen-age computer hacker known as Mafiaboy pleaded guilty last week to 55 of 66 counts of mischief in connection with last year's denial-of-service attacks that crippled several major Web sites. The attack brought down the Web sites of CNN.com, Yahoo Inc., Amazon.com Inc., eBay Inc. and others last February. The boy had previously pleaded not guilty to all charges.

FedEx Picks Simple Text Messaging in Europe

Expands mobile package tracking function

BY BOB BREWIN
AND MATT HAMBLEN

PARIS

UNABLE TO acquire the frequencies it needs to build the kind of extensive, private wireless data network it operates in the U.S., FedEx Corp. has started to roll out a digital dispatch and tracking system in Europe based on a popular wireless messaging service.

That system brings mobile package-tracking to parts of FedEx's European operation for the first time. Previously, drivers communicated with dispatchers by phone and logged packages when they reached a facility.

The mobile system is based on simple text messaging technology called Short Message Service (SMS). It's commonly used in Europe by teen-agers who send data messages to one another's cell phones.

It's also not compatible with the proprietary systems FedEx uses in the U.S., so the Memphis-based company is rolling out different hardware in Europe. The company developed a rugged truck-mounted terminal from Husky Computers Ltd. in Coventry, England, running Microsoft Corp.'s Windows CE operating system.

FedEx's U.K.-based regional IT director Grahame Ritchie, speaking at the company's European hub at Charles de Gaulle airport here, said the SMS system "mimics" the functionality of the proprietary system that FedEx uses in the U.S.

Once a European FedEx driver scans a package's bar code into his handheld computer, he transmits the information via an infrared port to the courier communications (CoCo) terminal in his truck. CoCo then transmits the data through the European cell phone network into the company's long-haul network and then into the FedEx mainframe in Memphis.

Ritchie said the SMS network provides "about the same throughput, 9.6 bit/sec.," as private packet data networks.

Rolling Out CoCo

FedEx started rolling CoCo out in Germany last year and plans to eventually deploy it throughout Europe, except for greater Paris and the U.K. There, the company has been able to use capacity on commercial packet data networks.

AT A GLANCE

European Operation

Highlights of FedEx's new wireless network in Europe:

- Uses mobile phone network Short Message Service channels for dispatch and package information network
- Uses new vehicle terminals based on Windows CE
- Mimics the private data network and terminals FedEx uses in U.S.

Nigel Deighton, a Gartner Group Inc. analyst based in London, called SMS the "most reliable" of the data services available on the European Global System for Mobile (GSM) telephone standard. SMS can get through when a voice call can't because it runs over the network signaling channel, he said. It also stores and forwards messages.

SMS messages dominate GSM data traffic and have enormous popularity, growing from 1 billion per month in December 1999 to more than 15 billion per month by the end of last year, Deighton said.

But Ken Dulaney, an analyst at Gartner, said, "The biggest problem [with SMS] is that the packet size is 160 [characters], and there is no guarantee that the messages are received in the order they are sent." However, since package-tracking and dispatch applications don't require the transmission of large amounts of data, SMS can probably handle such narrowband messages, Dulaney added.

Ritchie said FedEx evaluated Palm Inc.'s operating system and Linux in addition to Windows CE. The company opted for Windows CE "because it is much easier to write applications to," he said. ◗

BMW Makes Push Into Telematics Market

Some cars to have Web-enabled phone

BY LEE COPELAND

Bayerische Motoren Werke AG (BMW) entered the telecommunications market last week, rolling out a cellular phone with advanced features as standard equipment on its high-end luxury vehicles.

At the Detroit Auto Show, the Munich, Germany-based automaker announced that all of its 7 Series vehicles now come equipped with the BMW CPT 8000 digital phone.

The digital phone offers voice recognition and hands-free calling through steering-wheel or radio controls. The phone supports both Time Division Multiple Access and Code Division Multiple Access (CDMA). The CDMA version also comes equipped with an Internet browser. The CPT 8000 comes with an armrest cradle that allows the driver to access phone numbers and personal data from the phone through the vehicle's audio system.

Rob Leathern, an analyst at Jupiter Research in New York, said in-vehicle communications, or telematics, are becoming standard options on most vehicles. "In [the] future, as the technology gets cheaper, we'll see a wider range of devices that are equipped to serve multiple environments, [not just inside the vehicle]," said Leathern.

Detroit-based General Motors Corp., for example, offers its OnStar in-vehicle communications system on 32 of its vehicle lines. More than 1 million vehicles are equipped with the telematic service, and the automaker predicts that more than 4 million vehicles will carry OnStar by 2003.

BMW developed the CPT 8000 with Motorola Inc. in Schaumburg, Ill. It's based on Motorola's Timeport phone.

In related news, GM also announced last week that it would integrate voice recognition technology from Nuance Communications Inc. into its OnStar system. GM plans to utilize Menlo Park, Calif.-based Nuance's software as part of its Virtual Advisor service that delivers Web content to drivers via voice-activated commands.

Safety First

Adding voice activation in vehicles tackles a major hurdle in the development of in-vehicle communications systems, said Thilo Koslowski, an analyst at Gartner Group Inc. in Stamford, Conn.

"The voice-activation part has always been the challenge for telematic suppliers because of all the extraneous noise in a vehicle," said Koslowski. "In order to [safely] make use of all the devices and services in the car, you have to be able to control them by voice."

The CPT 8000 will also be available at an additional but not-yet-determined price on 2001 BMWs as a dealer-installed option by the end of March. ◗

Time Warner Telecom to Double Network Capacity

BY JAMES COPE

In a move spurred by an ever-increasing appetite for business bandwidth, Time Warner Telecom Inc. and Lucent Technologies Inc. signed a $100 million deal last week to deploy Lucent's latest optical networking technology across parts of the Time Warner Telecom network. That network is a competitive local exchange carrier in which AOL Time Warner Inc. in New York holds a 47.5% stake.

Joe Mambretti, director of the International Center for Advanced Internet Research at Northwestern University in Evanston, Ill., said the bandwidth demand is being driven by an increasing number of networked applications, such as streaming media. Only optical technologies can satisfy that demand, he said.

The new Lucent system will be installed in Littleton, Colo.-based Time Warner Telecom's western regional network. It uses advanced dense wave division multiplexing to double the bandwidth on the telecommunications company's current optical fiber infrastructure.

Murray Hill, N.J.-based Lucent said the system can deliver rates of 800G bit/sec., and it can be upgraded to accommodate 1.6T bit/sec.

Time Warner Telecom said the new technology will be applied to much of the network it recently acquired for $690 million from the bankrupt GST Telecommunications Inc. in Vancouver, Wash. Deployment of the optical system should be completed by the middle of this year, Lucent said. ◗

Believe
VERITAS SAN Solutions
VERITAS

BRIEFS

Blackouts Slow Utility Company Web Site

Amid rolling blackouts in California last week, users trying to reach the Web site of San Francisco-based Pacific Gas & Electric Co. (PG&E) for updates had to use more electricity waiting for the page to download, as response times rose more than 150% on Jan. 17. At its nadir, PG&E's home page took more than 21 seconds to load, according to Keynote Systems Inc. in San Mateo, Calif., which measures Web site performance.

America Online Grabs WAP Microbrowser

America Online Inc. said last week that it will develop and market a Netscape Communications Corp.-branded microbrowser based on the source code of the Wireless Access Protocol (WAP) microbrowser from Espoo, Finland-based Nokia Corp. Dulles, Va.-based AOL's version of the WAP browser will support the company's AOL Anywhere strategy of making content available on a range of devices in addition to PCs.

J.P. Morgan Goes Virtual for Payments

J.P. Morgan Chase & Co. said last week that it will roll out its electronic invoice presentment and payment system to more than 1,000 of its commercial banking clients by July. The New York-based company piloted the system with a handful of Fortune 500 wholesale banking clients.

Sun Says Cobalt RaQ To Complement Netra

Sun Microsystems Inc. announced plans for its new Linux-based Cobalt RaQ 4 server to complement its low-end Netra line, which uses Sun's Solaris operating system. The company said it expects its new Internet appliance, which includes Linux 2.2 and Apache and uses an Intel Corp. processor, to ship early next month at a starting price of $1,299. Sun also introduced a new Netra server with a starting price of less than $1,000.

While Lotus Pushes KM, Users Focus on R5 Migration

Lotusphere attendees offer peers advice

BY JENNIFER DISABATINO
LAKE BUENA VISTA, FLA

WHILE LOTUS Development Corp.'s main message at Lotusphere here last week was centered on knowledge management (KM), users were busy counseling one another on migrating to Notes R5 and were only beginning to contemplate the installation of KM systems.

One vice president of messaging at a large U.S. bank said he was at Lotus' users and partners conference for the first time. He said he chose to attend specifically to talk to his counterparts in other corporations about their R5 migration experiences.

The best part of the conference, the bank executive said, was feedback from companies such as Irving, Texas-based Exxon Mobil Corp., which decided to standardize on Notes as a messaging and collaboration platform following the merger of the two oil giants.

Attendees Frank Bustraen, vice president of Royal Philips Electronics NV in Amsterdam, and David Price, senior groupware architect at ABN Amro Bank NV, an international bank also based in Amsterdam, said they have had some experience with large-scale R5 migration projects. Royal Philips completed its migration as part of its year 2000 remediation work; ABM Amro's project is still under way.

Each firm has hundreds of mail servers in centers around the globe for tens of thousands of users, and each had to migrate users from more than one e-mail system. Both companies said it was critical to have staff dedicated solely to the project and to invest in hardware upgrades.

Price said he reduced ABN Amro's downtime to one-fourteenth of what it used to be. But hardware was key to getting there, he added.

"A couple of PCs under a desk doesn't count," Price said. "A lab for interoperability testing is not a nice-[to]-have but a must-have." He also suggested that R4 and R5 servers have duplicate server names during the testing process.

According to Price, most of the information that users will need when migrating is available through publications like Redbooks, which are technical resources from IBM. And apparently, that's a good thing.

"With minor exceptions, I am not going to praise Lotus support," Price said. "[But] we got enough benefit to make that [lack of support] not enough of an issue ... to prevent us going forward [onto R5]."

Price also said a replication monitoring tool from Wellesley, Mass.-based DYS Analytics Inc. has made monitoring the software much easier because it shows replication traffic on one screen for all ABM Amro servers around the globe.

Planning, Educating Are Key

Reiner Gratzfeld, manager of worldwide communications products at Henkel KGaA in Dusseldorf, Germany, has also used the DYS Analytics tool. Henkel was able to better plan its migration to R5 because the tool identified how much traffic was going to and from Domino servers, he said.

According to Bustraen, planning was key to the project, and educating users was key to implementation. "There is one time in life when we like to be changed by others, and that is when we have wet diapers. Otherwise, people have resistance to change," he said.

According to Price, users are particularly attached to messaging applications — especially the user interface — because they involve social interaction. Users are more likely to complain when their messaging application changes than they would, say, when confronted with a Microsoft Word upgrade, Price said. He recommended telling users up front about the limitations of the messaging application, because they will eventually find out.

RNext, the successor to R5, will be available for public beta testing in about three months, according to Lotus officials. ▶

Embedding Collaboration: Not Just a Technical Issue

The next step for collaboration software, many IT managers at Lotusphere said, is to embed components into line-of-business tools like customer relationship management (CRM) and enterprise resource planning (ERP) applications. But the move to embed may be as much a political issue as it is a technical one, as managers at user companies strive to defend their application turf.

Lotus is forming partnerships so resellers and other vendors can develop applications using Lotus collaboration products such as Notes, Domino, Sametime and QuickPlace.

According to Lotus officials, Notes RNext, the successor to R5 that's scheduled for release later this year, will be increasingly modular – constructed so pieces of the application can be taken out and embedded into other applications. Sametime and QuickPlace are similarly modular.

Frank Bustraen, vice president of corporate IT at Royal Philips Electronics, is using QuickPlace for collaboration outside the firewall with partner companies. He said he would really like to merge some QuickPlace features into Royal Philips' CRM and ERP applications. "You need this interconnection," he said. "Now [my coworkers] are starting to discover that. They now recognize that components are lacking."

Bustraen said he can even do it in-house. "With a little bit of coding, it can work," he said.

The problem, Busstran said, is that the Royal Philips manager responsible for CRM and ERP applications is reluctant to risk losing control of his domain. "There are political repercussions," he said.

– Jennifer DiSabatino

Fastest Cable Underseas Announced

BY JAMES COPE

London-based Cable & Wireless PLC announced last week that it will string a 13,000-kilometer cable system under the Atlantic Ocean between the U.S. and Europe.

The two-leg cable, named Apollo, will handle Internet protocol traffic at up to 3.2T bit/sec. One leg will carry data between the U.S. and the U.K. and the other between the U.S. and France. The cable is expected to be operational by the summer of next year.

The new cable will best today's fastest U.S.-to-Europe submarine link, which is owned and operated by London-based Flag Telecom Holdings Ltd. and, according to Cable & Wireless, is rated at 2.4T bit/sec. on each of its two legs.

Cable & Wireless has contracted with Alcatel in Paris to build the network at a cost of $442 million, plus an unspecified investment from Alcatel. ▶

CABLE & WIRELESS will string a 13,000-km. trans-Atlantic cable.

MILLION DOLLAR SERVICE

IN SAVINGS

Auto-Supply Exchange Targets Small Guys, Too

Johnson Controls to launch marketplace for design collaboration and bidding

BY LEE COPELANO

I[illegible] factor that threatens to hamper the cost-cutting technology initiatives of old industry manufacturers is managing an extensive supply chain that includes thousands of companies.

That's why Johnson Controls Inc., a manufacturer of car parts and environmental systems, is launching a design and collaboration business-to-business exchange for its automotive suppliers, said Mike Suman, group vice president for e-business and marketing at Johnson Controls.

Johnson Controls said it wants to replace homegrown product development software with an online exchange that will address both the bidding process with suppliers and the management of the design collaboration aspects of developing a product. E-commerce software from MatrixOne Inc. in Chelmsford, Mass., will form the bulk of the technology infrastructure.

"We're looking at replacing a legacy system that doesn't add value," said Suman. "But you can't take a new piece of software, tack it onto an old business model and produce the results that you want." Suman added that Johnson Controls will also update its financial system and reduce paper-based transactions with suppliers.

Beefy Competition

But the new exchange, scheduled to go online in March, also puts the manufacturer in competition with the Big Three automakers, which are three of its biggest customers. They already have a massive $200 million auto industry exchange in Southfield, Mich.-based Covisint LLC.

Milwaukee-based Johnson Controls last year generated $6.8 billion in revenue, or 40% of its total, from contracts [illegible] Ford Motor Co. and General Motors Corp.

Johnson Controls will join Covisint for its interaction with the Big Three, but it didn't want to wait for Covisint to gain industry momentum and start courting smaller suppliers to its marketplace, Suman said.

"The Tier 1 suppliers don't want to wait to see if Covisint will work out as the sole marketplace for the industry," said Thilo Koslowski, an analyst at [illegible]

[illegible]

Versatility Advantage

Another reason for building its own exchange: Johnson Controls [illegible] with customers in the construction, energy and aerospace industries. Building a private exchange may assist the company with those suppliers as well, said Kevin Prouty, an analyst at AMR Research Inc. in Boston.

"They're not just an automotive company," Prouty said. "So they have a vested interest in not tying themselves solely to one exchange."

But Johnson Controls isn't alone in being stuck between a major business-to-business exchange and a hard place. Dofasco Inc., a $2 billion company that manufactures steel for the construction, packaging and automotive industries, is in a similar situation. The Hamilton, Ontario-based steel maker owns an equity stake in Esteel.com, a steel industry business-to-business exchange, but may also join Covisint.

"I can see us belonging to multiple exchanges," said Doug Buchanan, manager of e-business at Dofasco. "It's a fact of life. Covisint is not going to buy steel for the packaging or other industries, but just for automotive purposes — and that's just one segment for our business." ▶

Johnson's Value Chain

Johnson Controls plans to build a B2B exchange for suppliers

Travelocity Predicts Profit Six Months Early

Travel site credits ad revenue, low cost to acquire customers

BY MICHAEL MEEHAN

While many dot-coms have become wreckage on the e-commerce highway, online travel agency Travelocity.com Inc. last week announced that it expects to be "at or close to profitability" by the end of the second quarter — six months earlier than previously predicted.

Fort Worth, Texas-based Travelocity added that it's forecasting profitability for the year as a whole. The company's success mirrors the strength of the online travel industry overall, in stark contrast to the woes of other Internet businesses.

Travelocity, which is majority owned by travel technology giant Sabre Inc., narrowed its net loss to $900,000, or 5 cents per share, for the fourth quarter [illegible], down from $3 million, or 16 cents per share, the previous quarter.

Its gross travel bookings in the quarter ended Dec. 31 reached an online travel industry record of $696.4 million, up from $380 million in the same period of 1999.

Ramesh Punwani, Travelocity's chief financial officer, pointed to strong advertising revenue and lower customer acquisition costs due to greater name recognition as key reasons for accelerating the profitability predictions.

"Truthfully, we've been a little dismayed that we've been lumped in with these other dot-coms," Punwani said.

Billions in Bookings

For last year as a whole, Travelocity recorded $2.5 billion in gross travel bookings. The company's rival, Bellevue, Wash.-based Expedia Inc., is due to report its fourth-quarter financial results today and is expected to approach the $2 billion mark for annual gross bookings.

Expedia lost just $1.6 million in last year's third quarter but warned that it would likely lose more than that in the fourth quarter because of expenses related to a new marketing campaign.

Meanwhile, Orbitz, a new online ticketing site funded by the five largest U.S. airlines — American, United, Delta, Northwest and Continental — is scheduled to make its debut in June. But Punwani said Travelocity officials don't expect that to have any impact on the company's drive toward profitability.

"There's plenty of room for other competitors," he said.

According to numbers compiled by online travel research firm PhoCusWright Inc. in Sherman, Conn., there were only $3.6 billion in gross online travel agency bookings in 1999 — a number Travelocity and Expedia bested in just three quarters of last year.

"This is a real business — one where companies are going to turn a profit," said David Provost, an analyst at Waltham, Mass.-based Gomez Advisors Inc. "The online travel industry is not going to suffer the same fate as so many other dot-coms."

Meanwhile, Fort Worth-based Sabre last week reported a $32.1 million fourth-quarter profit, down from $41.7 million in the same period in 1999.

The profit figure, which doesn't take into account several one-time expenses, was said to have been affected by Sabre's October acquisition of Menlo Park, Calif.-based rival GetThere Inc. and its spin-off last February from American Airlines Inc. owner AMR Corp. ▶

On Course to Profitability

Travelocity.com has forged a path toward profitability in a year when many of its online brethren have failed. Here's how it performed in 2000:

QUARTER	GROSS TRAVEL BOOKINGS	NET LOSS PER SHARE
Q1	$504M	38 cents
Q2	$610M	26 cents
Q3	$649.5M	16 cents
Q4	$696M	5 cents

Auto-Supply Exchange Targets Small Guys, Too

Johnson Controls to launch marketplace for design collaboration and bidding

BY LEE COPELAND

IF THERE'S ONE factor that threatens to hamper the cost-cutting technology initiatives of old industry manufacturers, it's managing an extensive supply chain that includes thousands of companies.

That's why Johnson Controls Inc., a manufacturer of car parts and environmental systems, is launching a design and collaboration business-to-business exchange for its automotive suppliers, said Mike Suman, group vice president for e-business and marketing at Johnson Controls.

Johnson Controls said it wants to replace homegrown product development software with an online exchange that will address both the bidding process with suppliers and the management of the design collaboration aspects of developing a product. E-commerce software from MatrixOne Inc. in Chelmsford, Mass., will form the bulk of the technology infrastructure.

"We're looking at replacing a legacy system that doesn't add value," said Suman. "But you can't take a new piece of software, tack it onto an old business model and produce the results that you want." Suman added that Johnson Controls will also update its financial system and reduce paper-based transactions with suppliers.

Beefy Competition

But the new exchange, scheduled to go online in March, also puts the manufacturer in competition with the Big Three automakers, which are three of its biggest customers. They already have a massive $200 million auto industry exchange in Southfield, Mich.-based Covisint LLC.

Milwaukee-based Johnson Controls last year generated $6.8 billion in revenue, or 40% of its total, from contracts to build car interiors, seats and batteries for DaimlerChrysler AG, Ford Motor Co. and General Motors Corp.

Johnson Controls will use Covisint for its interactions with the Big Three but didn't want to wait for Covisint to gain industry momentum and start courting smaller suppliers to its marketplace, Suman said.

"The Tier 1 suppliers don't want to wait to see if Covisint will work out as the sole marketplace for the industry," said Thilo Koslowski, an analyst at Gartner Group Inc. in Stamford, Conn. "The automakers only want to deal with the big suppliers, but in order to get to efficiencies, you have to work with more than that."

Driveshaft and piston-ring maker Dana Corp. is also building a private exchange to work with its 86,000 suppliers. The Toledo, Ohio-based manufacturer, which drummed up 33% of its revenue — $3 billion — from sales to Ford and DaimlerChrysler, will also work with the Covisint exchange.

Versatility Advantage

Another reason for building its own exchange: Johnson Controls draws 60% of its revenue — $10.2 billion — working with customers in the construction, energy and aerospace industries. Building a private exchange may assist the company with those suppliers as well, said Kevin Prouty, an analyst at AMR Research Inc. in Boston.

"They're not just an automotive company," Prouty said. "So they have a vested interest in not tying themselves solely to one exchange."

But Johnson Controls isn't alone in being stuck between a major business-to-business exchange and a hard place. Dofasco Inc., a $2 billion company that manufactures steel for the construction, packaging and automotive industries, is in a similar situation. The Hamilton, Ontario-based steel maker owns an equity stake in E-steel.com, a steel industry business-to-business exchange, but may also join Covisint.

"I can see us belonging to multiple exchanges," said Doug Buchanan, manager of e-business at Dofasco. "It's a fact of life. Covisint is not going to buy steel for the packaging or other industries, but just for automotive purposes — and that's just one segment [of our business]." ◗

AT A GLANCE

Johnson's Value Chain

Johnson Controls plans to build a B2B exchange for suppliers.

- The exchange will use software from MatrixOne.
- The online transaction system will address the bidding process with suppliers and design collaboration aspects of developing a product.
- Johnson's platform will integrate with the platform being developed by Covisint's online procurement exchange.

Travelocity Predicts Profit Six Months Early

Travel site credits ad revenue, low cost to acquire customers

BY MICHAEL MEEHAN

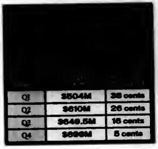
While many dot-coms have become wreckage on the e-commerce highway, online travel agency Travelocity.com Inc. last week announced that it expects to be "at or close to profitability" by the end of the second quarter — six months earlier than previously predicted.

Fort Worth, Texas-based Travelocity added that it's forecasting profitability for the year as a whole. The company's success mirrors the strength of the online travel industry overall, in stark contrast to the woes of other Internet businesses.

Travelocity, which is majority-owned by travel technology giant Sabre Inc., narrowed its net loss to $900,000, or 5 cents per share, for the fourth quarter of last year, down from $3 million, or 16 cents per share, the previous quarter.

Its gross travel bookings in the quarter ended Dec. 31 reached an online travel industry record of $696.4 million, up from $389.7 million in the same period of 1999.

Ramesh Punwani, Travelocity's chief financial officer, pointed to strong advertising revenue and lower customer-acquisition costs due to greater name recognition as key reasons for accelerating the profitability predictions.



"Truthfully, we've been a little dismayed that we've been lumped in with these other dot-coms," Punwani said.

Billions in Bookings

For last year as a whole, Travelocity recorded $2.5 billion in gross travel bookings. The company's rival, Bellevue, Wash.-based Expedia Inc., is due to report its fourth-quarter financial results today and is expected to approach the $2 billion mark for annual gross bookings.

Expedia lost just $1.6 million in last year's third quarter but warned that it would likely lose more than that in the fourth quarter because of expenses related to a new marketing campaign.

Meanwhile, Orbitz, a new online ticketing site funded by the five largest U.S. airlines — American, United, Delta, Northwest and Continental — is scheduled to make its debut in June. But Punwani said Travelocity officials don't expect that to have any impact on the company's drive toward profitability.

"There's plenty of room for other competitors," he said.

According to numbers compiled by online travel research firm PhoCusWright Inc. in Sherman, Conn., there were only $3.6 billion in gross online travel agency bookings in 1999 — a number Travelocity and Expedia bested in just three quarters of last year.

"This is a real business — one where companies are going to turn a profit," said David Provost, an analyst at Waltham, Mass.-based Gomez Advisors Inc. "The online travel industry is not going to suffer the same fate as so many other dot-coms."

Meanwhile, Fort Worth-based Sabre last week reported a $32.1 million fourth-quarter profit, down from $41.7 million in the same period in 1999.

The profit figure, which doesn't take into account several one-time expenses, was said to have been affected by Sabre's October acquisition of Menlo Park, Calif.-based rival GetThere Inc. and its spin-off last February from American Airlines Inc. owner AMR Corp. ◗

One idea
vation to ex
CAP GEMINI
ERNST & YOUNG
www.cgey.com

BRIEFS

More Dot-com Layoffs

The latest victims in a long series of layoffs at news-oriented Web sites worked at NBC Internet Inc. Late last week, San Francisco-based NBCi said it was cutting its revenue projections by one-third, to $100 million, which will result in 150 layoffs, or 30% of the staff. These lost jobs will be added to the more than 43,000 layoffs that have occurred in the Internet market during the past year. According to Zona Research Inc. in Redwood City, Calif., even with steadily increasing layoffs, the Internet employment downturn represents only 0.7% of those unemployed in the U.S.

Microsoft Meets Lowered Estimates

Microsoft Corp. reported financial results for its fiscal second quarter that were in line with a reduced-expectations warning issued last month, adding that it remains "guarded" about how the short-term economic outlook will affect PC demand and overall technology spending. Microsoft had a profit of $2.62 billion on revenue of $6.59 billion in the quarter ended Dec. 31, but the latter figure was roughly 6% below its original plan.

PCs, Macs Stumble

Gateway Inc. last week announced it would lay off 10% of its workers after previously revealing much lower profits on decreased revenue for its fourth quarter. The San Diego-based company also set lower expectations for growth, at least through the first half of this year. Apple Computer Inc. said its loss for the most recent quarter reached $195 million on a sales shortfall of more than $600 million. Apple CEO Steve Jobs expressed optimism for business in the current quarter.

Staffing Changes

VIGNETTE CORP., a supplier of electronic-business applications, confirmed Friday that it has cut about 450 jobs, or 19% of its workforce, to reduce operations cost. . . . TechNet, a technology advocacy group, in Palo Alto, Calif., has named former Rep. RICK WHITE (R-Wash.) its new CEO.

Presidential Librarians Prep for IT Challenges

Archivists face millions of papers, e-mails

BY MARK HALL

NOW THAT President Clinton has left the Oval Office, aides say he will be spending a lot of his time on his presidential library. Yet a big part of the challenge belongs not to him but to the IT staff that must grapple with a volume of work and incompatible IT systems that will make it nearly impossible to fully catalog his administration.

Skip Rutherford, president of the President Clinton Library Foundation, opened the door this week to his operation's temporary location in Little Rock, Ark. However, the initial batch of hard-copy materials available to the public will barely be the tip of the massive information iceberg from the two-term Clinton administration.

"We have 40 million e-mail messages alone," Rutherford said. "The sheer volume of information from the Clinton administration is partly due to technology advancements."

Quantity of information is only the beginning of the problems for Clinton librarians, said Michelle Cobb, an analyst at the College Park, Md.-based Office of Presidential Libraries, which is part of the National Archives. She said more than 100 independent systems in the executive branch must be migrated to a common platform.

Compounding the migration problem is that the systems themselves become part of the presidential record, according to Jenny Sternaman, an archivist at the Ronald Reagan Library in Simi Valley, Calif.

To comply with the mandate of the National Archives to retain the records of its government, Sternaman and other archivists need to employ individuals who can run outdated technology. But archivists also need to move data from long-retired systems to a modern, readable common format.

Currently, the idea is to make all the information available via a browser. But it's not as simple as scanning in documents or putting a Web front end on mainframe data, archivists said. It's about providing context, which can be particularly daunting for electronic-based documents.

"It's an amazing prospect to make sure all the messages are accounted for and that the context is maintained," Cobb said.

She said some online files use graphical information systems. Portions of these GIS files are frequently printed or e-mailed and dispersed among users. Tying these partial documents together in the context of the entire GIS file is a complex, time-consuming task.

Even if context can be realized, the indexing or archiving of it seldom occurs without the help of requests made under the Freedom of Information Act (FOIA), said Sternaman. She said her crew is able to handle only searches based on FOIA requests. As a result, she estimated that a mere 15% of the library has been indexed after 12 years. ◗

- Hundreds of data formats and systems
- Technical talent is needed to keep old systems working
- Millions of documents need to be turned into electronic files
- Millions of e-mails need to be indexed in context

Continued from page 1

Federal IT

Bush, the former governor of Texas, is also bringing in a team that has advocated privatizing state services and using e-government to improve service and shrink staffs.

In Texas, IT outsourcing is well above the average for all states. In fiscal 2000, outsourcing expenditures represented 29% of the state's total IT budget, compared with a nationwide average of about 18%, according to a report last year by the Texas Department of Information Resources.

Moreover, a top IT adviser to Bush is former Indianapolis Mayor Stephen Goldsmith, a Republican who was a leader in privatizing many IT services in that city and who has won national awards for delivering e-government services.

Last month, Texas Comptroller Carole Keeton Rylander released a study saying that e-government initiatives could lead to savings of $1.2 billion in two years. The plan would discontinue requirements for face-to-face interviews to determine Medicaid eligibility and use call centers and Internet applications to improve the enrollment process.

Darrell West, director of the Center for Public Policy at Brown University, said he believes Bush will be a strong proponent of e-government services. "It is an area that offers potential to enhance service delivery at lower cost, so it fits perfectly into his political agenda," West said.

Joseph Leo, CIO at the U.S. Department of Agriculture and a 34-year federal employee who plans to leave his post soon, said federal CIOs haven't had the advantages that private-sector CIOs enjoy because many senior federal officials still don't recognize the importance of IT in service delivery. CIOs have been hurt by a lack of budget authority, he said, adding that a federal CIO can act as an "honest broker," raising the profile of IT issues in the federal government.

"There is an acknowledgment and recognition that the information technology component is essential for the company's well-being and, indeed, success. In the public sector, that is not yet recognized," said Leo. ◗

Gillette Outsources All Sites

BY JULEKHA DASH

The Gillette Co. in Boston announced it will consolidate all hosting and operations management of its global Web sites this year, relying on two outsourcing vendors.

Exodus Communications Inc. in Santa Clara, Calif., now hosts 12 of the company's Web sites, while Redwood City, Calif.-based Certainty Solutions Inc. provides systems monitoring, network services and enhanced site performance, said Jim Easton, director of enterprise applications at Gillette. He said he expects the vendors to eventually host and operate all 25 of Gillette's Web sites from a central location in northern Virginia.

The goal is to ensure more consistent service levels across the company's sites, Easton said.

"It's a common reason for turning to an outsourcer to deal with a management issue," said Joel Yaffe, an analyst at Giga Information Group Inc. in Cambridge, Mass.

Once the management of its sites is centralized, Web visitors getting information about, for instance, Gillette's Braun line of products, which are developed in Germany, would receive the same service level as those who go to the site of Gillette's U.S.-based Duracell unit.

"When you have content developers scattered around the world, a company wants to put a consistent face forward to its public," said Counse Broders, an analyst at Current Analysis Inc. in Sterling, Va. ◗

Bring the world of global business within your reach

Spending Slowdown Unlikely To Squelch IT Vendor Plans

Users and analysts say they're confident that vendor plans will remain unchanged

BY JAIKUMAR VIJAYAN

ANALYSTS AND users say they're optimistic that the major server vendors will stick to their product schedules this year, despite a predicted slowdown in corporate IT spending.

Major enterprise hardware vendors such as Sun Microsystems Inc., Hewlett-Packard Co. and IBM have either just started shipping or are slated to ship major upgrades to their technologies this year.

Though some of these vendors have warned of weak demand in the coming months, so far none has announced any plans to slow or defer its product rollouts as a result.

"I am not concerned at all [about vendors delaying products this year]," said Dan Kaberon, a parallel sysplex manager at Hewitt Associates LLC, a Lincolnshire, Ill.-based human resources outsourcer.

Hewitt has just placed orders for six of IBM's new 64-bit mainframes, which started to ship late last month. Kaberon said Hewitt plans to upgrade as needed through the year.

'Brighter Chrome'

"In fact, it's when things slow down that vendors push much harder to show something that has the longer fin and the brighter chrome," Kaberon said.

Such sentiments come at a time when corporate users are getting ready for some major product migrations. All of the server vendors have recently announced significant refreshes to their technology and are expected to ramp up to full production this year (see chart).

"These are all infrastructure products that are budgeted for," said Joyce Becknell, an analyst at Boston-based Aberdeen Group Inc. "I can't imagine a vendor saying they are going to delay rolling them out."

Other products expected in 2001 are new servers based on Intel Corp.'s upcoming Itanium chip — the first of its new IA-64 family — from all major vendors of Intel hardware.

"I don't see vendors holding back anything," said Bob Sutherland, an analyst at Technology Business Research Inc. in Hampton, N.H.

That's because doing so will only concede the market advantage to other vendors in an already tight situation, according to analysts.

Spending slowdowns are part of the challenge of being a global IT vendor, said Mark Hudson, a global marketing director at HP. In that sense, the current U.S. slowdown isn't very different from the Asian slowdown that HP faced some time ago, Hudson added. "Anytime there is a slowdown, you need to step back and look at the basics and make sure you understand what customers really want," he said. "But there will be no change in HP's product plans as a result."

"Nothing has changed," agreed Lynn Thorsen-Jensen, a director of strategic marketing for Compaq Computer Corp.'s high-end server business. The market slowdown may lead to a re-evaluation of demand-creation and awareness-generating campaigns, but it won't result in any product delays or changes, Thorsen-Jensen said. "The [high-end] markets we are focused on are moving forward strongly," she said.

"If anything, vendors are only likely to roll them out faster" to gain any advantage they can in a depressed spending environment, she said.

Any cost-cutting measures by vendors are likely to affect marketing and sales efforts instead of product and support, Becknell said ◗

Hardware Wish List

Enterprise hardware scheduled for volume shipment by major vendors this year includes:

Sun's UltraSPARC III-based Starcat: A successor to the current E10000, the server will support between 74 and 105 CPUs. As many as four Starcats can be clustered together to act as a single computer.

HP's PA-8600-based Superdome: A 64-processor server featuring hardware- and software-based partitioning with failure isolation functionality and support for up to 128GB of memory.

IBM's Z/900: First 64-bit mainframe from IBM. Supports up to 16 processors and delivers up to 2,500 MIPS performance. It features dynamic load balancing and support for thousands of virtual servers in one box.

MORE

For more on the effects of an economic slowdown on IT, **see page 30.**

Continued from page 1

Unions

turn, unions aren't well-suited to the needs of technology workers and will only exacerbate their problems.

Lew Brown, Etown's president and chief operating officer, contends that unlike unions, which have a "political agenda," he cares about his employees' jobs and well-being.

Poh said unions can't prevent layoffs, nor is it their intention to put anyone out of business. But as dot-coms feel the financial squeeze, labor is the first to go, Poh said.

[Unions] are not terribly flexible when it comes to making changes for the workforce or customer base.

PATTY SMITH, SPOKESWOMAN, AMAZON.COM

Workers with a collective bargaining agreement, however, can choose to have salaries cut or reduce the workweek as an alternative to layoffs.

That might have helped workers at Stamford, Conn.-based research company Walker Digital. On Jan. 11, Connecticut Attorney General Richard Blumenthal filed a federal lawsuit against the firm, claiming that it failed to provide adequate notice before laying off 106 workers in November.

Other Organizing Efforts

The Etown.com situation is only one of several efforts under way to organize high-tech workers. In October, the Washington Alliance of Technology Workers (WashTech) began a drive to organize customer service representatives at Amazon.com Inc.'s headquarters.

"If dot-com workers are concerned about job security, advancement and training, now is the time to talk about this with co-workers," said WashTech organizer Gretchen Wilson. "Once you are [laid off], you are powerless." Since the Amazon.com union drive became public, customer service representatives haven't been required to work mandatory overtime, even during the holiday season, she said.

But Amazon.com spokeswoman Patty Smith denied that the union drive has had any impact on Amazon's day-to-day operations. She said there was no mandatory overtime during the holidays because the company had enough incentive programs to entice volunteers.

"Amazon needs to be flexible in order to innovate on behalf of customers and employees," she added. "[Unions] are not terribly flexible when it comes to making changes for the workforce or customer base."

WashTech also led the industry's most visible effort to organize technology workers in its lawsuit against Microsoft Corp. Last month, Microsoft announced that it would pay $97 million to 8,000 temporary workers and their attorneys, who charged that the software vendor should have offered the temps the same stock option benefits as regular employees.

But despite layoffs and the economic downturn, most IT workers would gain little from unions, since they receive good pay and benefits, critics argue.

Michael Berch, who was laid off in October as IT director at Internet Pictures Corp. in Oak Ridge, Tenn., said that until recently, most technology workers didn't fear layoffs because they figured they could easily find another job.

But in the past month, Berch said, as the pace of job cuts has quickened, there has been an "undercurrent of discontent among a lot of junior people [who were] enticed to Silicon Valley by dot-coms."

However, Berch added, the atmosphere at many dot-coms is so informal and collegial that workers who joined a union could alienate co-workers and managers with whom they are friends.

"I think it's very risky" to unionize high-tech workers, agreed Challenger Gray CEO John Challenger. "These companies can ill afford a union movement that pushes up their employment costs."

Union officials acknowledge that organizing high-tech workers meets some resistance.

"There is a tremendous amount of fear about speaking about workplace issues" among high-tech workers, said WashTech's Wilson. But, she added, "There are few places for people in high-tech to turn to." ◗

Spending Slowdown Unlikely To Squelch IT Vendor Plans

Users and analysts say they're confident that vendor plans will remain unchanged

BY JAIKUMAR VIJAYAN

ANALYSTS AND users say they're optimistic that the major server vendors will stick to their product schedules this year, despite a predicted slowdown in corporate IT spending.

Major enterprise hardware vendors such as Sun Microsystems Inc., Hewlett-Packard Co. and IBM have either just started shipping or are slated to ship major upgrades to their technologies this year.

Though some of these vendors have warned of weak demand in the coming months, so far none has announced any plans to slow or defer its product rollouts as a result.

"I am not concerned at all [about vendors delaying products this year]," said Dan Kaberon, a parallel sysplex manager at Hewitt Associates LLC, a Lincolnshire, Ill.-based human resources outsourcer.

Hewitt has just placed orders for six of IBM's new 64-bit mainframes, which started to ship late last month. Kaberon said Hewitt plans to upgrade as needed through the year.

'Brighter Chrome'

"In fact, it's when things slow down that vendors push much harder to show something that has the longer fin and the brighter chrome," Kaberon said.

Such sentiments come at a time when corporate users are getting ready for some major product migrations. All of the server vendors have recently announced significant refreshes to their technology and are expected to ramp up to full production this year (see chart).

"These are all infrastructure products that are budgeted for," said Joyce Becknell, an analyst at Boston-based Aberdeen Group Inc. "I can't imagine a vendor saying they are going to delay rolling them out."

Other products expected in 2001 are new servers based on Intel Corp.'s upcoming Itanium chip — the first of its new IA-64 family — from all major vendors of Intel hardware.

"I don't see vendors holding back anything," said Bob Sutherland, an analyst at Technology Business Research Inc. in Hampton, N.H.

That's because doing so will only concede the market advantage to other vendors in an already tight situation, according to analysts.

Spending slowdowns are part of the challenge of being a global IT vendor, said Mark Hudson, a global marketing director at HP. In that sense, the current U.S. slowdown isn't very different from the Asian slowdown that HP faced some time ago, Hudson added. "Anytime there is a slowdown, you need to step back and look at the basics and make sure you understand what customers really want," he said. "But there will be no change in HP's product plans as a result."

"Nothing has changed," agreed Lynn Thorsen-Jensen, a director of strategic marketing for Compaq Computer Corp.'s high-end server business. The market slowdown may lead to a re-evaluation of demand-creation and awareness-generating campaigns, but it won't result in any product delays or changes, Thorsen-Jensen said. "The [high-end] markets we are focused on are moving forward strongly," she said.

"If anything, vendors are only likely to roll them out faster" to gain any advantage they can in a depressed spending environment, she said.

Any cost-cutting measures by vendors are likely to affect marketing and sales efforts instead of product and support, Becknell said. ■

MORE THIS ISSUE

For more on the effects of an economic slowdown on IT, **see page 30.**

Continued from page 1

Unions

turn, unions aren't well-suited to the needs of technology workers and will only exacerbate their problems.

Lew Brown, Etown's president and chief operating officer, contends that unlike unions, which have a "political agenda," he cares about his employees' jobs and well-being.

Poh said unions can't prevent layoffs, nor is it their intention to put anyone out of business. But as dot-coms feel the financial squeeze, labor is the first to go, Poh said.

> [Unions] are not terribly flexible when it comes to making changes for the workforce or customer base.
>
> PATTY SMITH, SPOKESWOMAN, AMAZON.COM

Workers with a collective bargaining agreement, however, can choose to have salaries cut or reduce the workweek as an alternative to layoffs.

That might have helped workers at Stamford, Conn.-based research company Walker Digital. On Jan. 11, Connecticut Attorney General Richard Blumenthal filed a federal lawsuit against the firm, claiming that it failed to provide adequate notice before laying off 106 workers in November.

Other Organizing Efforts

The Etown.com situation is only one of several efforts under way to organize high-tech workers. In October, the Washington Alliance of Technology Workers (WashTech) began a drive to organize customer service representatives at Amazon.com Inc.'s headquarters.

"If dot-com workers are concerned about job security, advancement and training, now is the time to talk about this with co-workers," said WashTech organizer Gretchen Wilson. "Once you are [laid off], you are powerless." Since the Amazon.com union drive became public, customer service representatives haven't been required to work mandatory overtime, even during the holiday season, she said.

But Amazon.com spokeswoman Patty Smith denied that the union drive has had any impact on Amazon's day-to-day operations. She said there was no mandatory overtime during the holidays because the company had enough incentive programs to entice volunteers.

"Amazon needs to be flexible in order to innovate on behalf of customers and employees," she added. "[Unions] are not terribly flexible when it comes to making changes for the workforce or customer base."

WashTech also led the industry's most visible effort to organize technology workers in its lawsuit against Microsoft Corp. Last month, Microsoft announced that it would pay $97 million to 8,000 temporary workers and their attorneys, who charged that the software vendor should have offered the temps the same stock option benefits as regular employees.

But despite layoffs and the economic downturn, most IT workers would gain little from unions, since they receive good pay and benefits, critics argue.

Michael Berch, who was laid off in October as IT director at Internet Pictures Corp. in Oak Ridge, Tenn., said that until recently, most technology workers didn't fear layoffs because they figured they could easily find another job.

But in the past month, Berch said, as the pace of job cuts has quickened, there has been an "undercurrent of discontent among a lot of junior people [who were] enticed to Silicon Valley by dot-coms."

However, Berch added, the atmosphere at many dot-coms is so informal and collegial that workers who joined a union could alienate co-workers and managers with whom they are friends.

"I think it's very risky" to unionize high-tech workers, agreed Challenger Gray CEO John Challenger. "These companies can ill afford a union movement that pushes up their employment costs."

Union officials acknowledge that organizing high-tech workers meets some resistance.

"There is a tremendous amount of fear about speaking about workplace issues" among high-tech workers, said WashTech's Wilson. But, she added, "There are few places for people in high-tech to turn to." ■

CRANK
UP THE
VOLUME.

DELL

Web Mortgages May Be Due For a Comeback This Year

Lower rates expected to spur interest

BY MARIA TROMBLY

LAST SPRING, companies like Mortgage.com promised to revolutionize the process of borrowing money to buy a house by making the process easier, quicker and cheaper.

But by the end of the year, the company was officially dead, and its Web address was bought by ABN Amro Mortgage Group Inc. in Troy, N.Y., a subsidiary of Amsterdam-based ABN Amro Holding NV.

Although there were fears that Mortgage.com's closing demonstrated that mortgages were, in fact, too complex to sell over the Internet, analysts now argue that online mortgages may be poised to take off this year due to more familiarity with the Internet and the recent cut in interest rates.

According to George Barto, an online banking analyst at Stamford, Conn.-based Gartner Group Inc., Mortgage.com's failure simply demonstrates that it couldn't survive the downturn in the economy — not that people are unwilling to buy mortgages online.

Net-Enabled Home-Owning

According to a survey of 1,674 home owners and renters commissioned by Washington-based mortgage services company Fannie Mae last summer, 28% of Americans would definitely or probably use the Internet to get a home mortgage, and 32% would consider it. About 4% of recent home buyers applied for mortgages online, according to Fannie Mae.

And a recent forecast from the Mortgage Bankers Association of America estimates that the rate for a 30-year fixed-rate mortgage this year will drop to 7.5%, compared with 8.1% last year. The number of refinancings is expected to increase with that interest rate drop.

Milt Riseman said he's ready for an increase in new customers — but he doesn't know quite when they'll show up.

Riseman is chairman of the consumer mortgage group at American Business Financial Services Inc. in Bala Cynwyd, Pa. The 12-year-old company owns the Upland Mortgage Web site, which currently sees a couple of million dollars per month in business — out of $45 million to $50 million total.

But a good number of online start-ups lacking that traditional base couldn't survive. In addition to Mortgage.com's demise, Homespace.com, Loanz.com, Onloan.com and eJumbo.com folded or decided to get out of the market.

Promises of huge cost savings through automation haven't come true for the online-only sites because of high customer acquisition costs, according to analysts.

Few Pure-Plays Left

That leaves only a few pure-play online mortgage companies still standing, including E-Loan Inc. in Dublin, Calif., and LendingTree Inc. in Charlotte, N.C. The consolidation may be good for the industry, said Barto. "The amount of online lending is not declining — only the number of players dividing up that business," he said.

RISEMAN: He's ready for clients but not sure when they'll come.

The other types of companies that survived last year's shakeout are the traditional firms that now offer their customers an online channel. And, as in other industries, the brick-and-clicks approach to mortgage sales may be the most successful, said analyst Aaron McPherson at Framingham, Mass.-based IDC. "It needs to evolve more organically from an existing, stable business."

Another part of the mortgage life cycle is the secondary market, of which about $16.5 billion is expected to be traded online this year, McPherson said. The secondary market is where mortgages are bundled and sold to third parties.

This amount could jump significantly, McPherson added, if McLean, Va.-based Freddie Mac and Fannie Mae, which collectively control the vast majority of this market, move their acquisition processes online.

Dairy Industry Gets Set for B2B Exchange

Dairy.com to use spot-market model for perishables

BY JAMES COPE

Deals for dairy products such as whole milk and cream can go sour when buyers and sellers can't find each other and quickly match up their needs.

But officials at Dairy.com, a business-to-business exchange for the dairy industry that's owned and operated by MomentX Corp. in Dallas, said that problem will soon change. The company announced last week that within the next two to three months, Dairy.com will add functions that will enable dairy product producers and processors to buy and sell raw dairy products using a spot-market model.

Currently, such spot-market transactions for liquid dairy products such as skim milk and cream are made through phone calls and faxes, said Jeff Makohon, vice president of solutions at MomentX. He said the system is fraught with inefficiencies, which is a problem because dairy products have to be delivered and used while they're fresh.

THE ASSOCIATED PRESS

THE DAIRY INDUSTRY is hungry for the efficiencies that an online exchange could bring, say Dairy.com officials and other observers.

Dairy.com, which MomentX chief technology officer Greg Bott said would be managed and hosted by network outsourcer Digex Inc. in Beltsville, Md., will use a matrix of criteria that buyers and sellers can use to find each other and complete a transaction in a matter of minutes. Those criteria include product type, grade, butterfat content, load size, shipping and receiving locations, price and a variety of other requirements.

Anonymous Matching

"Everything takes place anonymously until a good match is made," Bott said. Only then, he explained, will one party become visible to the other. Users of the exchange can also screen out companies they prefer not to do business with, Bott said.

Several dairy companies, including Kraft Foods Inc. in Northfield, Ill., Land O'Lakes Inc. in Arden Hills, Minn., and the Suiza Foods Corp. in Dallas, developed the concept and founded the exchange.

But dairy industry officials said the exchange didn't succeed until the founders spun it off in a merger with Dallas-based Inc2inc Technologies Corp. in December, creating MomentX.

Inc2inc operates food ingredient and packaging exchange Inc2inc.com and had the technology in place to run Dairy.com, said Steve Gackenbach, director of joint ventures at Kraft Foods.

Gackenbach said he believes the exchange will help streamline the dairy business. Today, a dairy product manufacturer that needs a truckload of cream may have to make a lot of phone calls to find a supplier that has the right product quality at the right price and that can ship it in a timely manner, Gackenbach said.

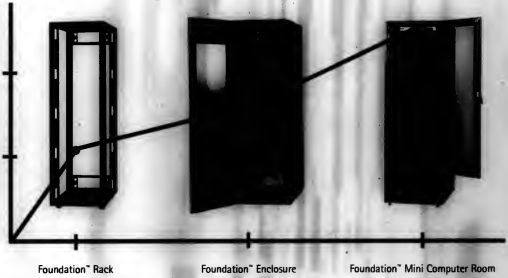
"I may link up with a supplier that's 1,000 miles from my facility, not knowing there's a potential supplier offering the same product only 500 miles away," Gackenbach said.

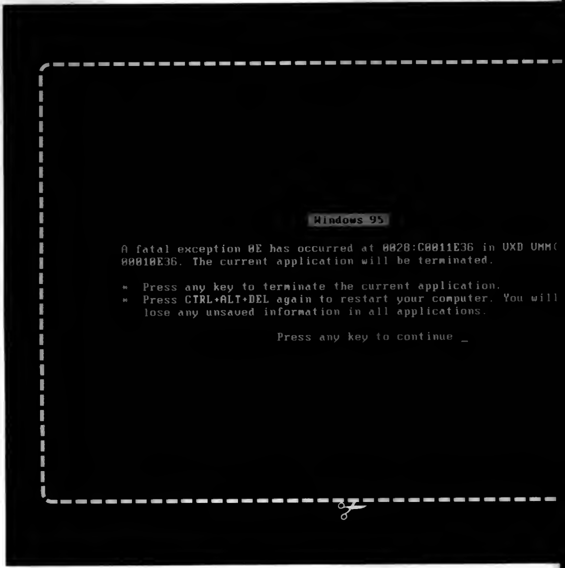
"[Dairy.com] will give people in the dairy industry more real-time market visibility of how much milk, cheese or cream is out there," said Marty Devine, senior vice president of industry relations at Suiza Foods.

Opportunity for Success

Patrick Duparcq, professor of e-commerce at the Krannert School of Management at Purdue University in West Layfayette, Ind., said that for online exchanges like Dairy.com to be successful, they have to perform functions that aren't adequately performed through existing means.

That opportunity seems to exist in the dairy industry, Duparcq noted, which he said could make Dairy.com an "Internet natural."


Foundation™ Rack
Foundation™ Enclosure
Foundation™ Mini Computer Room



```
Windows 95

A fatal exception 0E has occurred at 0028:C0011E36 in VXD VMM(
00010E36. The current application will be terminated.

*  Press any key to terminate the current application.
*  Press CTRL+ALT+DEL again to restart your computer. You will
   lose any unsaved information in all applications.

                    Press any key to continue _
```

Florida Voting Problems Open Door for System Vendors

BY PATRICK THIBODEAU

The Florida voting fiasco is turning into an opportunity for some big vendors to bring electronic systems to market. But election officials say the solution to the problem is much more than a point-and-click away and that major obstacles confront the vendors.

Microsoft Corp., Dell Computer Corp. and Unisys Corp. said they plan to develop an electronic voting system that would cover every aspect of the process, including registration, identification, voting and tabulation. IBM is also considering developing such systems.

Many states use antiquated voting technology such as punch cards and mechanical voting lever machines because replacing that equipment is expensive and not a high priority when compared with other needs, say election officials.

New York, for instance, has estimated the cost of replacing its voting lever machines with touch-pad electronic systems at $100 million, according to Lee Daghlian, a spokesman for the New York State Board of Elections.

"If money weren't an issue, New York City would have [changed over] a long time ago," he said.

Resolve, Then Build

Congress will consider legislation this year that would make federal funds available for election reform. Hearings are expected, but much remains up the air.

Kevin Curry, a vice president at Blue Bell, Pa.-based Unisys, said the companies won't be able to deploy any new system until they see what elections standards Congress and federal officials set. One question, for example, is whether officials will allow the use of smart cards. These standards will determine what kinds of systems are possible, said Curry. Until all the issues are sorted out, "it would be ridiculous to build something," he said.

Election officials are eyeing the changes warily.

Julie Pearson, an auditor and elections supervisor for Pennington County, South Dakota, said she wants to see vendor diversity in any case, partly because of security issues. To be able to fix an election, someone would have to know "the details of every state law [and] of every system that is being used in every state before they could do that," Pearson said.

Any new electronic system has to have an open architecture capable of interoperating with other electronic systems, said Deborah Phillips at the Voting Integrity Project, an Arlington, Va.-based group that studies voting rights and technology issues.

"If all you are doing is plugging in new equipment, then all you are doing is changing the set of problems," she said. ◆

High-End Linux Clusters Will Serve Scientific Applications

BY TODD R. WEISS

IBM and the National Center for Supercomputing Applications (NCSA) last week announced plans to build a pair of high-performance Linux clusters that will provide 2 TFLOPS of computing power for use in scientific applications.

A Pentium-based system is scheduled to be installed next month at the NCSA at the University of Illinois at Urbana-Champaign. A companion setup using Intel Corp.'s upcoming 64-bit Itanium chip is scheduled to follow in the summer. Together, the two clusters will consist of almost 700 IBM servers running Linux.

Dan Reed, director of the NCSA, said the machines will provide the processing power that researchers will need to further analyze Albert Einstein's theory of relativity and to conduct other scientific and engineering queries. These projects include simulating the violent collision of black holes and the gravitational waves they produce.

"You could solve these problems on your desktop [computer], but you may have to wait 10,000 years to get the answer," Reed said.

Hundreds of Servers

The initial cluster will include 512 of IBM's eServer x330 thin servers, each equipped with two 1 GHz Pentium III processors and Research Triangle Park, N.C.-based Red Hat Inc.'s version of Linux.

Plans call for the Itanium-based system to be outfitted with 160 servers that will run Brisbane, Calif.-based TurboLinux Inc.'s version of the open-source operating system.

The two systems will be linked using cluster interconnect technology developed by Myricom Inc. in Arcadia, Calif.

Dave Gelardi, director of IBM's deep computing Linux cluster group, said the computer maker hopes the work being done at the NCSA and other supercomputing sites will eventually lead to Linux-based applications for corporate users.

"It's our intention to take this work and move it into commercial [settings]," Gelardi said, listing Web servers and collaborative computing systems as possible avenues for the technology.

The NCSA's plans follow the announcement of several other Linux-based supercomputers and high-performance clusters in recent months. For example, the oil exploration unit of the Hague-based Royal Dutch/-Shell Group last month announced that it is working with IBM to build a system that will link 1,024 servers to analyze seismic data as part of the search for new sources of oil. ▶

MORE ONLINE For more information about today's security issues, visit our Web site. www.computerworld.com/security

Compaq, Intel Contribute to $115M Investment in Stratus

BY JAIKUMAR VIJAYAN

The recent $115 million investment made by Compaq Computer Corp., Intel Corp. and DB Capital Partners Inc. in Stratus Technologies is part of an effort to help the maker of fault-tolerant computing systems significantly expand its market reach and presence.

The Swiss company has also reached technology collaboration agreements with Compaq and Intel. Under the agreements, Compaq will license and use Stratus' fault-tolerant technology in upcoming server products, according to Stratus President and CEO Stephen C. Kiely. Meanwhile, Intel and Stratus will work closely to optimize Intel technology for fault-tolerant computing, Kiely said.

Boosted Presence

Announced two weeks ago, the partnerships should help Stratus boost its presence in the market, Kiely said.

"We are today a $320 million company in an industry dominated by companies 100 times our size," Kiely said. "We concluded that our maximum impact and value delivery to our customers will occur when we become part of the product stream of a major industry player."

Besides the agreement with Compaq and Intel, Stratus already has a licensing relationship with NEC Corp. in Japan.

Though such licensing deals will form a core part of Stratus' sales strategy going forward, the company will also continue to make and market servers under its own brand name, Kiely said.

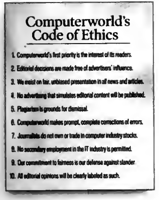
The strategy makes sense for Stratus and its customers, said John Enck, an analyst at Gartner Group Inc. in Stamford, Conn.

"Stratus has been struggling to find its rightful place in the new market" with its fault-tolerant technology, Enck said. Because Stratus is relatively small, its products "were pretty much guaranteed to be niche products that would appeal only to a small segment of users," he said.

The partnerships with Compaq and Intel should help change that perception, Enck noted.

The $115 million investment will be made in the form of a preferred stock purchase. The shares will be acquired from Investcorp SA, a global investment company with offices in New York, London and Bahrain. Investcorp is the majority shareholder in Stratus.

Stratus and Investcorp will retain majority interest and voting control of the company following the conclusion of the transaction, which is expected to be completed by Feb. 1, according to Kiely. ◗



BRIEFS

EMC Shuffles Execs

Hopkinton, Mass.-based storage vendor EMC Corp. last week announced management changes that gave it a new CEO and a chairman. EMC founder Dick Egan stepped down as chairman of the board to become chairman emeritus; he will be succeeded by Mike Ruettgers. Former chief operating officer Joe Tucci has filled Ruettgers' slot as CEO and president.

NorthPoint Files For Chapter 11

Seven weeks after being sent into a financial tailspin by Verizon Communications' termination of a proposed merger deal between the two companies, struggling digital subscriber line (DSL) service provider NorthPoint Communications Group Inc. last week announced that it has filed for Chapter 11 bankruptcy protection. The San Francisco-based company said it will try to sell off virtually all of its assets.

Motorola Trims U.S. Manufacturing

Schaumburg, Ill.-based Motorola Inc. last week said it would cease manufacturing at its Harvard, Ill., cellular phone plant around June 30, resulting in the termination of 2,500 manufacturing jobs. The remaining 2,500 employees at the Harvard site will provide customer order fulfillment and other support. A company executive said the closure resulted because the company couldn't "competitively manufacture products when there is surplus global capacity at Motorola's lower-cost sites" in other countries.

L&H Replaces CEO With Belgian Exec

Embattled software vendor Lernout & Hauspie Speech Products NV (L&H) last week announced that Philippe Bodson, a Belgian executive who's also a member of that country's senate, will serve as CEO. He replaces CEO John Duerden, who will remain as director of the firm. No reasons were given for the ousting of Duerden from the Ieper, Belgium-based firm.

Analysts See Rough Year Ahead for Hardware Firms

Job cuts, lowered expectations cast shadow

BY JAIKUMAR VIJAYAN

CONCERNS over the economy, combined with a slowdown in demand — particularly from dot-com companies and application service providers — threaten to make this a difficult year for hardware makers, analysts said.

Major hardware vendors such as Hewlett-Packard Co. and Compaq Computer Corp. have already lowered their expectations for the year, citing reduced demand for their products. And some, such as Gateway Inc. and Motorola Inc., are resorting to layoffs to cut costs in the months ahead.

Among the major players, only IBM appears to have remained untouched so far. The company last week slightly beat market expectations when it announced earnings of $2.7 billion on revenue of $25.6 billion. Its broad technology portfolio may have spread out the impact of any hardware decline, helping the company make its numbers, analysts said.

But analysts aren't sure what the slowdown means for users in terms of new products and support from other companies. In the short term, they expect vendors to go ahead with products that have already been announced, but technologies further down the road could get pushed back. There also could be a reduction in the number of product models to keep support costs down, analysts said.

Dot-com Aftermath

However, most major products are still on schedule. Sun Microsystems Inc., for instance, is on track to start shipping its UltraSPARC III products later this year. HP recently started shipping its Superdome server, and IBM is on track with its z900 mainframes.

New York-based Merrill Lynch & Co. is predicting that spending on nearly every class of server — and particularly high-end boxes — will slow down during the next two years. The increase in growth for Unix-based machines, for instance, will drop from 28% in 2000 to 14% in 2001, while demand for servers such as the OS/390 and AS/400 will drop from 28% in 2000 to 5% in 2001, according to a recent report from the company.

"There was a burgeoning demand for hardware caused by the growth of the Internet over the last few years that has now begun to slow down," said Bob Sutherland, an analyst at Technology Business Research Inc. in Hampton, N.H.

Fred Halperin, a managing director at Miami-based IT services firm Answerthink Inc., estimated that nearly one-third of hardware sales during the past two years or so have come from Internet companies building their IT infrastructures.

Similarly, an ongoing consolidation in the application service provider market — another big demand-generator in the past two years — should impact hardware demand in the near future, predicted Laurie McCabe, an analyst at Summit Strategies Inc. in Boston.

Reinforcing these economic predictions are concerns over a much closer scrutiny of IT budgets among corporate buyers, analysts said.

"The slowdown here is much less significant than in the e-world, but all hardware investments are being put through a more rigorous cost-justification and ROI process," Halperin said.

There are already indications that a slowdown has begun. Just last week, chip maker Intel Corp. predicted a 15% drop in first-quarter sales because of a slowdown in PC spending and economic uncertainties. It said that its research and design budgets wouldn't be affected, however. ▶

Layoffs Show Climate in Consulting Sector

BY JULEKHA DASH

Consulting Cuts

Consulting firms that have announced layoffs in 2000:

December

- Scient Corp.
- Viant Corp.

November and September

- iXL Enterprises Inc.

As the number of failed dot-coms continues to climb, so do the number of consulting firms announcing layoffs.

Earlier this month, Dallas-based Perot Systems Corp. said that it will eliminate 200 jobs as part of a restructuring, and Cambridge Technology Partners Inc. announced that it has cut 280 jobs, following its 400-person layoff last October.

"A lot of layoffs have derived from a similar problem: firms staffed up to do more work than they currently have," said Joshua Randall, an analyst at Fitzwilliam, N.H.-based Kennedy Information Research Group.

Technology services — including consulting — was one of the the top industries to announce layoffs during the last three months of 2000, according to Chicago-based outplacement firm Challenger Gray & Christmas Inc.

Analysts blamed the woes on the slowing economy in addition to the loss of dot-com clients.

"In an uncertain economy, companies pull back on discretionary spending," which means cutting the budget for services such as advertising and consulting, said Randall.

In spite of the industry's shakeout, recruiters say consultants and IT staff who have been laid off can still find plenty of opportunities.

Opportunity Still Knocks

Jim Fields was laid off from his job as associate director of Cambridge Technology's Miami office in October after eight years with the firm. Soon afterward, he received two offers from smaller consulting firms founded by former Cambridge Technology employees. Fields now works at Fort Lauderdale, Fla.-based consulting firm Semtor Inc.

But, he noted, some of his friends who remain at Cambridge Technology are still worried about their positions.

"I like to think that Cambridge will survive once it gets down to the right size and makes the same cuts to its management structure as to its consulting force," he said.

Noreen Compton was laid off from Cambridge Technology last month as a creative producer for the company's Web site and said she believes "consultancy work is shaky" now. Compton, who is doing some freelance writing for online services, is looking for work as a project manager or producer at larger technology companies and Fortune 500 firms.

Bruce Gonzalez, associate director of Atlanta-based recruiting firm Matrix Resources Inc., said consultants with technology skills can land positions at software firms that are similar to their previous contract positions. And those with a mix of management and technical expertise can find work as project managers at small and large brick-and-mortar firms, he said.

"Consultants still have their pick of jobs," said Gonzalez. But, he added, these days, they may be mulling three or four offers, vs. five or six a year ago. ▶

INSTANT
TEAR HE
Sto
PLUG IN
ENJOY
and Go

MARYFRAN JOHNSON

Global Catch-22

EVERYTHING I READ about the globalization of IT and business leads me to conclude that it's the IT equivalent of *Mission: Impossible.* There are substantial barriers everywhere you look: cultural, political, regulatory, infrastructural, technical and human ones.

So, it can't be done. Yet there it is, swiftly taking shape as the Next Big Thing for companies doing business on the Web. In our cover story last week (aptly titled "Global Landmines"), we called it "an inescapable force in business — one that can boost your career or leave you behind." Easy for us to say, huh?

Maryfran Johnson is editor in chief of *Computerworld*. You can contact her at maryfran_johnson@computerworld.com.

A CEO friend who works with CIOs at multinational companies points out that "global" has become shorthand for anything that isn't local or in your time zone. "The way to think of global business," he says, "is that it's outside your normal realm of understanding. It becomes 24-hour and multicultural. Once that happens, you'd better have an organization that reflects that kind of behavior." Of course, few organizations do.

Consider the technology problems that a worldwide business encounters today. Telecommunications support overseas is uneven at best and may cost 10 times what a similar service in the U.S. does. The hardware and software underpinning your native e-business, the prime mover for globalization, seldom match their capabilities abroad. So you end up dealing with multiple firms that are strangers to you. Bandwidth is still limited, wireless is immature and infrastructures are a mess. There are no international standards for invoicing, exchanging data or performing some of the most basic business functions electronically.

On the plus side, an increasing number of countries are racing to make legal and infrastructure improvements to attract foreign businesses. "The trend is to deregulate and basically open up to the forces of globalization," observes Bruce McConnell, the former White House official who led the International Y2k Cooperation Center and now heads up his own international consulting firm. But the corporate and cultural problems remain daunting, ranging from language barriers and IT talent shortages to a regulatory nightmare of tax codes, privacy laws and security concerns.

So what's an IT leader to do, given this global catch-22? The best starting point is awareness. Once you start thinking globally, you'll be asking different questions of your vendors and looking for different skills in your employees. Just start tapping into the problem-solving mind-set that got you interested in IT in the first place. The world awaits you. ◗

BUDGET DIRECTOR
SLAM!
IT Projects
"DAMN. THEY WOULD'VE FUNDED US LAST YEAR."

PIMM FOX

ERP Could Be Answer to Calif. Power Crisis

IF YOU'RE READING this, it means the lights didn't go out in Silicon Valley when I wrote it. The California Independent System Operator, which runs the electricity grid out here, has warned that the state is in a Stage 3 emergency, which means it should prepare for rolling blackouts.

The immediate issue is the inability of Southern California Edison and Pacific Gas & Electric to pay for the power they resell to businesses and consumers.

And while some blame increased Internet usage for current electricity woes, a fundamental problem is a lack of IT resources to more effectively use existing power.

Pimm Fox is *Computerworld's* West Coast bureau chief. Contact him at pimm_fox@computerworld.com.

The state's power industry needs to spend money on an enterprise resource planning (ERP) structure that allows information to flow not only inside power companies in California, but also among those throughout the region and into customers' companies, in the same way electricity travels through the regional power grid.

One identified problem is shutting down power generators for routine maintenance without first knowing that another plant might be shutting down, too. This lowers the supply of electricity, pushing up costs. And a cold winter across the country has also hurt supply. But it shouldn't take an electricity and natural gas emergency to address IT needs.

During the first two weeks of last month, significant electricity shortages occurred in California after several power plants voluntarily shut down for scheduled maintenance, emissions concerns and breakdowns without alerting officials at other plants. This cut the state's electricity production, forced utilities to shop for power outside the region and placed greater demands on operating facilities. Additionally, with a limited pool of trained utility workers, there needs to be a greater coordination of resources.

Using a collaborative ERP approach could reduce some of these conflicts.

The problem is that ERP has been supplanted by the rush to e-business technology. Transforming a business into an e-business is a great idea, and some proponents of utility deregulation speculate that trading power via the Internet should help utility customers. But it doesn't remove the hurdles to improving ERP systems in the industry.

First, there are no ERP systems designed to deliver information both inside and outside a utility company's walls. Second, a collaborative resource planning package would be expensive, and it would be difficult getting utilities and power operators to link together. And it isn't always clear when payback will come.

Critics of California's power companies have been quick in their opposition to rate hikes. Utilities asked for a doubling of rates, though so far only a 10% temporary increase has been granted.

But these increases will be spent on purchasing electricity, not on solving the twin issues of building more power plants and using IT to wring the most out of existing ones.

The high construction costs of a new plant may suddenly make a new ERP system seem downright affordable. ◗

JOHN GANTZ

How to Pick and Choose in the New ASP World

IT'S TIME FOR my annual column on application service providers (ASP). This isn't just because I've been widely quoted in the media recently as saying they will disappear (and need to explain myself) but also because the collapse of the dot-com sector raises questions about *all* IT market segments feeding off those successive rounds of capital.

The *real* story about ASPs is that some *will* disappear, others will be acquired and many more will adjust their business models to make up for the collapse of their dot-com customers and to deal with customers' changing needs. And a lot of hype will disappear.

The ASP business model has always looked good on paper: Let somebody else buy and manage complex enterprise application packages while you go about running or supporting your core business. Indeed, the No. 1 reason early ASP users chose that model, according to IDC research, was so they could "focus on core business." The second was to cut down on application implementation costs. ASPs would make money based on economies of scale centered around application expertise and infrastructure investment.

JOHN GANTZ is a senior vice president at IDC in Framingham, Mass. Contact him at jgantz@idc.com.

But if any ASPs thought that all that customers wanted was access to software owned by someone else — dial-an-app, if you will — they were mistaken. The problem that users really want ASPs to solve isn't one of software ownership but one of integration with other applications. Some of these other applications will be in the ASP's product set, with more, probably, in the user's own environment.

As a result, the basic ASP business model will morph from one of renting software access to one of delivering services. This changes how companies will make money in the business.

IDC research conducted last fall, in which early adopters were interviewed, confirms this. The choice of services offered by ASPs ranked higher in importance among early adopters than did which applications the ASPs supported. Having contractual service-level agreements ranked No. 1, with integration services ranked second. What are the takeaways? Based on the research and some common sense, it means the following:

- First, you shouldn't dismiss the ASP alternative just because a market consolidation is under way. IDC still expects the market to double to more than $1 billion this year.
- Second, you should evaluate your ASP like you do your big vendors — the top four success criteria seeming to be, (1) ability to scale, (2) applications offered, (3) the range of services offered and (4) the stability of the management team.
- Third, at least for this year, you also need to evaluate your ASP's financial staying power. Will it be able to survive? What percentage of its customers were dot-coms? How does cash flow look? Can it keep the people you need to run your applications?
- Fourth, you also need to evaluate the staying power of your ASP's business partners. Who's actually running the data centers? Will that company survive? Who's offering customer support? Is the software vendor going to bail out?

This will be a frenetic year in the ASP space, as companies buy and sell each other, rejigger their business models, adjust their marketing plans and reposition their services. It will be confusing.

You might also consider choosing another acronym by which to refer to your ASP. The dot-com crash could drag the acronym through the mud. So *ASP* will have a different connotation this year than it did last year. ◗

READERS' LETTERS

Watch Your Downtime

I SUSPECT most of your readers recognize that 99% uptime is disgraceful ["Hardware Problems Shut Down eBay for 11 Hours," News, Jan. 8], equaling 3.5 days of downtime over the course of a year. When someone says they've had 99% uptime over four quarters, I expect their next words to be "and we are looking at alternative computing platforms."

Rick Dale
Lakeville, Minn.

The IT-Friendly Skies

THE GUY you wrote about in "Uncovering a Worker's Paradise Amid the Friendly Skies" [Business, Jan. 8] is a babe in the woods when it comes to utilizing frequent-flier points. Using my husband's points, we've been to Europe four times in the last year alone, several times in first class. We also make great use of hotel frequent-stay points. This year, we've cashed in points to stay free in Paris, Amsterdam, Cancun and Milan. Most of the time, the hotels upgrade us to suites. If you're going to be a road warrior, you need to learn how to use your points when you really need them. You've earned them!

Lori Rubin
Rancho Palos Verdes, Calif.

Girls, Give IT a Chance

IT'S UNFORTUNATE that girls don't see the potential they have in the IT world ["If Girls Don't Get IT, IT Won't Get Girls," Business, Jan. 8]. When I chose my career, an important factor was how family-friendly it would be. While many girls choose careers that traditionally provide a good balance between career and family, they're overlooking the fact that the world of computers is anything but traditional.

So far, my career in IT has been happy and rewarding. I have felt respected, and I have never felt like my career would jeopardize my family life.

Elizabeth A. Decker
IT consultant
Metro Information Services
Fort Lauderdale, Fla.

What I Said Was . . .

I BELIEVE I was misquoted in "Directory Service Coexistence: Can We Talk Here?" [Technology, Jan. 15] What I believe I said was, "We're going to move from NT to AD at some point, but it isn't happening fast," but the article has me saying, "We're going to move from NDS to AD." We still have a very large NDS system in place, and we're happy with its robustness and stability. To my knowledge, we have no plans to move off NDS.

Mark Thorsen
Network services manager
New York Times Shared Services Center
Norfolk, Va.

CIOs Are Cost-Aware

IN THE ARTICLE "Licensing Showdown Looming" [Page One, Jan. 1], Carlyle Ring asserts that he is "doubtful about that [$20 million increased expense] estimate being attributable to anything in UCITA." While his comment is predictable given his role in authoring the proposed act, it's worth noting that, to my knowledge, Ring hasn't spent any time as the CIO of a large corporation.

Those of us who are CIOs know our businesses, our infrastructures, our cost requirements and the detailed interplay among all of those much better than Ring does, just as he undoubtedly understands lawyering better than I. All of us in a CIO capacity have a professional obligation to judiciously and appropriately hold operating costs down. We strive to construct and manage infrastructures that can absorb or be flexible in adapting to business change without associated appreciable cost increases. The estimates that have been given to date aren't cavalier reactions, but rather the results of careful analyses where the participants were hoping that no increases would be required. That's just not how it turns out.

Bruce C. Barnes
Vice president, technology strategy and planning
Nationwide Insurance Cos.
Columbus, Ohio

COMPUTERWORLD welcomes comments from its readers. Letters will be edited for brevity and clarity. They should be addressed to Jamie Eckle, letters editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax (508) 879-4843. Internet: letters@computerworld.com. Include an address and phone number for immediate verification.

AVAYA communication
Does

DON TAPSCOTT

Bush Can Use IT To Aid Democracy

HE MAY BE barely two days into the job, but if President Bush really wants to assure his place in history, he should take the lead in addressing the most pressing question facing governments and citizens worldwide: In the digital age, what is the next step in the evolution of democratic government?

I'm not talking about avoiding another Florida fiasco by voting through digital ballot boxes or voting from home on Sony Playstations. This would only add a high-tech veneer to an increasingly dysfunctional democratic system.

The basic frameworks of the representative democracies around the world today were written by quill pens centuries ago and are quickly becoming obsolete in the Internet Age. Were we to start with a clean slate and design a government to fit our needs, we would never put in place today's plodding beast.

DON TAPSCOTT is chairman of Digital 4Sight (www.digital4sight.com) and co-author of *Digital Capital* (Harvard Business School Press, 2000). Contact him at dtapscott@digital4sight.com.

Emerging digital citizens have a different and higher set of expectations of government and politics than their Industrial-Age predecessors. Digital citizens, who are not content to stand in line for routine transactions or passively receive media-fed campaign bulletins, impatiently demand better service, more convenient access to information and people and the opportunity to have their say on their own terms.

Elections are ostensibly the voters' opportunity to tell governments what to do, but, increasingly, voters don't believe the system is working. Virtually every democracy is suffering growing voter cynicism.

Today, political parties present rosters of candidates, and the winners go off to the country's capital to do largely as they see fit. They cogitate, debate and vote within their sealed bubbles. After a fixed period of time, another election is held to pass judgment on the job they have done.

This system made sense back when the West was being settled. Citizens didn't have the education, time, resources or communication tools to have meaningful, ongoing discussions with elected officials. Public policy issues moved at a horse-and-buggy pace, and issues could be taken "to the people" at election time.

Today, the pace of change is much faster. When unforeseen problems arise, governments can't credibly claim to have a clear mandate to deal with them. Yet, few systems exist for governments to seek solid direction from voters between elections.

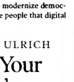
This issue goes beyond simply knowing what the people want, since opinion polls can provide that information. Governments could introduce digital mechanisms to encourage discussion and raise awareness of issues, and thereby benefit much more from the wisdom and insight that a nation can collectively offer. How would this work? It's never been tried on a large scale. Some small experiments are occurring around the world where governments are prepared to listen, not just talk. The U.K. has taken to the idea of online "citizen juries" by posting citizen hearing proceedings on the Internet. The Danish Board of Technology has a portal for continuous dialogue between citizens and government decision-makers.

Bush should seize the momentum for electoral reform in the U.S. to spark a much broader discussion. He should pledge to modernize democracy and give full voice to the people that digital tools now offer. ◆

WILLIAM M. ULRICH

Managing Your 'Ecosystem'

ONE WAY to view a corporation is through the "information ecosystem" it inhabits. An ecosystem emerges when a community and its surrounding environment function as an interwoven collective; from a corporate perspective, an information ecosystem is comprised of systems, data, processes, people and external entities that impact or are impacted by that corporation.



WILLIAM M. ULRICH is a management consultant and president of Tactical Strategy Group Inc. Contact him via www.systemtransformation.com.

Ecosystems have always existed, but Internet-based business-to-business exchanges have increased the interconnectedness among suppliers, customers and even competitors. For an organization to survive and thrive within an information ecosystem, it must understand and optimize the relationships among the ecosystem's components and participants. Doing so brings value to your company, suppliers, partners and customers. Effective ecosystem management provides several benefits:

- You can respond more quickly to requests for change because you can envision the impact of changes on parts of the ecosystem.
- Exposing ecosystem relationships facilitates integration and streamlining of processes, systems and data, which in turn can reduce costs and increase responsiveness to customers.
- Knowing which third parties use or provide certain data allows you to respond more quickly to their needs.
- A comprehensive view of an ecosystem's components provides better insight into making decisions on cross-functional projects.
- Understanding relationships with third parties establishes a foundation for collaborating with them.

The auto industry provides one example of information ecosystem management. Major auto manufacturers have created business-to-business exchanges for buying and selling materials and are expanding these capabilities across their supply chains. They're also eliminating customer intermediaries through the creation of online marketplaces. But the most significant factor in the industry's quest to leverage its information ecosystem is that these efforts involve collaboration with competitors.

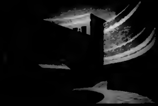
The recognition that corporations are part of a big picture has evolved as supply chain, electronic marketplaces and other Web-enabled business models emerge. As we increase our understanding of this view, we see how companies can effect change for the betterment of entire industries.

But existing ecosystem models, such as those forged by the auto industry, will change as well. The auto industry has institutionalized a "participant" model, in which a handful of larger members dominates the ecosystem. This will likely change as smaller members self-organize and lobby to offer input into the ecosystem's future.

To leverage information ecosystems, IT and business executives should focus on ecosystem understanding, collaboration and governance. **Understanding** involves creating a knowledge base that reflects the relationships among data, systems, processes, business units and external entities. This knowledge can, in part, be shared with other members of the ecosystem — a supply chain, for example. Business-to-business relationships may then be reincorporated back into the enterprise knowledge base.

An ecosystem functions most effectively when its participants work together to tackle industry-wide challenges. This requires **collaboration** between your company and suppliers, customers and competitors. But internal collaboration among IT, business units, outsourcing firms and other elements within your company is also important because in the past, business and IT units have not always collaborated effectively. **Governance** formalizes, through the creation of a legal entity, ecosystem models that are in many cases implicit. This is particularly important when developing supply chain, customer and competitive relationships. Governance defines how an ecosystem's participants should act and what rights they have. This includes issues such as direct access to data, data integrity, privacy, security, software ownership and licensing rights, as well as other areas that might emerge.

Rapid change, technological advancements, competition and other unknown issues will continue to emerge to challenge companies in every industry. Approaches to dealing with these challenges must consider the big picture. Understanding and managing your information ecosystem will better prepare you to deal with existing and unforeseen changes. ◆



BUSINESS

NEW ROUTE FOR TRANSPORTATION

Users of the new Internet marketplace FreightWise say it makes it easier for them to conduct business and fills a gap in the transportation industry. But analysts say the company's business model isn't a surefire winner. ▶ **40**

TRADING UP?

Nasdaq's new SuperMontage trading system got a thumbs up from the SEC earlier this month. But opponents say they still fear that the system will decrease competition in the industry and possibly increase costs to consumers. ▶ **40**

RECESSION SURVIVAL TIPS

If the economy slides into a recession, many companies will find themselves in unknown territory, writes Ed Yourdon. Most IT professionals weren't in the job market during the 1991 recession, but Yourdon's been around since the mid-'60s and has some tips to help IT projects survive. ▶ **41**

FAST COMPANY

At Cambridge Incubator, the IT staff has to be ready to roll out the infrastructure for a new company at the drop of a hat. To accommodate that, the entire company is built around speed and flexibility. ▶ **41**

WAR GAMES

We made it through the Y2k rollover relatively unscathed. But other, more sinister threats could still be lurking about. An organized series of cyberattacks could very well send society into such chaos that it could cripple the military's ability to communicate and move troops. That's where the Critical Infrastructure Assurance Office comes in. The group has been gearing up for such an attack since its creation in 1998. ▶ **44**

HIRING OVERSEAS

When hiring workers with H-1B visas, MasterCard International doesn't stop after the salary is negotiated. The company has a relocation program that matches newcomers with people of the same nationality to help answer common questions. Workforce experts say such a system is a wise move for companies looking to recruit highly skilled foreign workers in today's tight labor market. ▶ **52**

ASP ASSISTANCE

What do you look for when entering into an agreement with an application service provider? Service-level agreements can help you spell out the measures for performance and consequences for failure. ▶ **53**

RECRUITERS CAN teach managers a thing or two about talent scouting and retention.

GUARDING YOUR GATES

WAKE UP! Your employees may not be looking, but that doesn't mean they're not going anywhere. IT recruiters know how to contact and lure your top staff. So what do you do to hang on to them? Fight fire with fire. Arm yourself with the same tactics recruiters are using to steal your talent so you can beat them at their own game. **50**

Exchange Seeks to Deliver The Real Goods for Users

FreightWise: Filling gap in transportation or just another flash in the pan?

BY LINDA ROSENCRANCE

TO SUCCEED in the world of transportation management, an online exchange must make doing business more profitable, more reliable and easier for carriers and shippers.

According to some customers who participated in a trial run, the FreightWise Inc. online marketplace has the right stuff to succeed in an increasingly crowded market. The exchange, a truckload and intermodal (shipping containers carried by trucks and rail) matching site, had a controlled launch in October and went live at the end of last year.

Marsha Price, director of customer service and sales marketing at Triton Transport Services Inc. in Westlake, Ohio, said that before using Fort Worth, Texas-based FreightWise, if Triton had a truck sitting idle in the yard, the dispatcher would have to make 20 or 30 calls to shippers to find goods to put on that trailer.

"Now, we can take 100 trailers and post them onto the marketplace, where hundreds and thousands of shippers are looking for trucks for their loads," Price said.

No Face-to-Face Meetings

However, while Price acknowledged that FreightWise helps to eliminate paperwork and reduce costs, she said she's concerned that online exchanges don't help foster the face-to-face meetings that help firms develop confidence in one another.

Developed by the Burlington Northern Santa Fe Railway Corp. (BNSF), also in Fort Worth, FreightWise gives its customers the opportunity to offer, select and pay for transportation services online, said Greg Fox, FreightWise's president and CEO.

The exchange charges a 3% commission — split between buyer and seller — per transaction, with a minimum charge of $25. Shippers and carriers can participate in the marketplace in two ways: Carriers can auction off their capacity to shippers in real-time auctions, or shippers and carriers can enter into agreements based on previously published rates.

Unlike exchanges that merely function as bulletin boards where users post loads and available capacity and then finalize transactions off-line, FreightWise allows buyers and sellers to execute the entire transaction online, said Fox.

Doug Granger, vice president of logistics at Hershman Recycling Inc. in Branford, Conn., which moves more than 30,000 full truckloads per year, said he has only three people to handle the company's freight-booking operations.

"It takes a lot of work to book loads manually — it usually takes 20 minutes to book one load," he said. "And it's also difficult to find a carrier to move our freight in and out of remote areas. But with FreightWise, we put in our parameters and it comes up with a solution, telling us where there is the necessary equipment that is a perfect match for our load."

"It's more cost-effective, because we can make a decision without having to make 100 phone calls, and we can complete the entire transaction — from the cradle to the grave — online," Granger added.

While Price and Granger say they're excited about Freightwise's future, Donald Broughton, an analyst at A.G. Edwards & Sons Inc. in St. Louis, expressed some reservations about its ability to survive.

"This is an example of a railroad trying to move in on the trucking industry via the Web," said Broughton.

"It's interesting, but you already have other players like Transplace" — a Web-based marketplace developed by six major trucking firms, he added. "Because [the trucking industry] is not [BNSF's] niche, it will be an uphill climb." ◆

USING FREIGHTWISE, Triton Transport can post listings of available trucks and complete transactions with shippers online.

SEC OKs Nasdaq Trading System, Despite Objections

BY MARIA TROMBLY

Although the Securities and Exchange Commission unanimously approved a new trading system for the Nasdaq Stock Market earlier this month, opponents are still concerned that it may decrease competition and increase costs to consumers.

The new system, called SuperMontage, gives Nasdaq traders options — such as anonymity — previously available only through competing electronic communication networks (ECN), which currently handle 30% of Washington-based Nasdaq Stock Market Inc.'s trading volume.

This could reduce competition by tilting the playing field away from ECNs and toward more traditional players. It could also accelerate the rate of consolidation among the ECNs, according to Alan Alper, an analyst at Gomez Advisors Inc. in Waltham, Mass.

But overall, the new system will make it easier for investors to get the best possible prices on stocks, he said.

"It's something that's been long awaited and has a great deal of utility for the industry," said Alper.

SuperMontage Primer

Highlights of the new system:

- **It is expected to be ready in the first quarter of 2002.**
- **Displays will include second- and third-best prices, not just the best.**
- **Brokers can separate their own trades from those of their customers without having to go through alternative trading systems.**
- **Participants will be able to place anonymous bids and asks, though the executions themselves won't be anonymous.**

But Nasdaq has other problems, including the fact that it is more expensive than the New York Stock Exchange when it comes to buying and selling stocks, according to Barbara Roper, director of investor protection at the Consumer Federation of America in Washington.

"The SEC has approved a system that perpetuates all of the problems that exist in the current marketplace," she said.

An SEC report released Jan. 8 said that Nasdaq investors may be paying as much as 11 cents per share more than NYSE investors for stocks because spreads (the difference between the price at which an investor places an order and the price at which it is filled) can change rapidly.

Skipping Earlier Orders

One problem, said Roper, is that brokers often fill customers' orders by matching them internally with orders placed by other customers — skipping over individual investors who might have placed orders earlier through ECNs.

SuperMontage, Roper said, just makes this process faster without fixing it.

But Nasdaq spokesman Scott Peterson said that the SEC study compared apples to oranges because Nasdaq lists the stocks of small companies that wouldn't qualify to be listed on the NYSE.

"In our largest securities, our top 50 stocks — which, by the way, represent 53% of all the trading on the Nasdaq — our spreads were as good as theirs or better," said Peterson.

He added that Nasdaq's spreads have fallen by 75% since 1997 and will continue to drop under the new system.

Other critics of the SuperMontage trading system include ECNs such as New York-based Instinet Corp.

"The implementation of SuperMontage will exacerbate Nasdaq's costly and inefficient trading system," said Instinet spokeswoman Silvia Davi. "But it has come a long way from the original one that was introduced over a year ago."

In September, for example, Nasdaq agreed to do away with a controversial plan to automatically put prices offered through ECNs last on its list of available trades if the private systems charged extra fees to traders. ◆

Exchange Seeks to Deliver The Real Goods for Users

FreightWise: Filling gap in transportation or just another flash in the pan?

BY LINDA ROSENCRANCE

TO SUCCEED in the world of transportation management, an online exchange must make doing business more profitable, more reliable and easier for carriers and shippers.

According to some customers who participated in a trial run, the FreightWise Inc. online marketplace has the right stuff to succeed in an increasingly crowded market. The exchange, a truckload and intermodal (shipping containers carried by trucks and rail) matching site, had a controlled launch in October and went live at the end of last year.

Marsha Price, director of customer service and sales marketing at Triton Transport Services Inc. in Westlake, Ohio, said that before using Fort Worth, Texas-based FreightWise, if Triton had a truck sitting idle in the yard, the dispatcher would have to make 20 or 30 calls to shippers to find goods to put on that trailer.

"Now, we can take 100 trailers and post them onto the marketplace, where hundreds and thousands of shippers are looking for trucks for their loads," Price said.

No Face-to-Face Meetings

However, while Price acknowledged that FreightWise helps to eliminate paperwork and reduce costs, she said she's concerned that online exchanges don't help foster the face-to-face meetings that help firms develop confidence in one another.

Developed by the Burlington Northern Santa Fe Railway Corp. (BNSF), also in Fort Worth, FreightWise gives its customers the opportunity to offer, select and pay for transportation services online, said Greg Fox, FreightWise's president and CEO.

The exchange charges a 3% commission — split between buyer and seller — per transaction, with a minimum charge of $25. Shippers and carriers can participate in the marketplace in two ways: Carriers can auction off their capacity to shippers in real-time auctions, or shippers and carriers can enter into agreements based on previously published rates.

Unlike exchanges that merely function as bulletin boards where users post loads and available capacity and then finalize transactions off-line, FreightWise allows buyers and sellers to execute the entire transaction online, said Fox.

Doug Granger, vice president of logistics at Hershman Recycling Inc. in Branford, Conn., which moves more than 30,000 full truckloads per year, said he has only three people to handle the company's freight-booking operations.

"It takes a lot of work to book loads manually — it usually takes 20 minutes to book one load," he said. "And it's also difficult to find a carrier to move our freight in and out of remote areas. But with FreightWise, we put in our parameters and it comes up with a solution, telling us where there is the necessary equipment that is a perfect match for our load."

"It's more cost-effective, because we can make a decision without having to make 100 phone calls, and we can complete the entire transaction — from the cradle to the grave — online," Granger added.

While Price and Granger say they're excited about Freightwise's future, Donald Broughton, an analyst at A.G. Edwards & Sons Inc. in St. Louis, expressed some reservations about its ability to survive.

"This is an example of a railroad trying to move in on the trucking industry via the Web," said Broughton.

"It's interesting, but you already have other players like Transplace" — a Web-based marketplace developed by six major trucking firms, he added. "Because [the trucking industry] is not [BNSF's] niche, it will be an uphill climb." ▶

USING FREIGHTWISE, Triton Transport can post listings of available trucks and complete transactions with shippers online.

SEC OKs Nasdaq Trading System, Despite Objections

BY MARIA TROMBLY

Although the Securities and Exchange Commission unanimously approved a oew trading system for the Nasdaq Stock Market earlier this month, opponents are still concerned that it may decrease competition and increase costs to consumers.

The new system, called SuperMontage, gives Nasdaq traders options — sucb as anonymity — previously available only through competing electronic communication networks (ECN), whicb currently handle 30% of Washington-based Nasdaq Stock Market Inc.'s trading volume.

This could reduce competition by tilting the playing field away from ECNs and toward more traditional players. It could also accelerate the rate of consolidation among the ECNs, according to Alan Alper, an analyst at Gomez Advisors Inc. in Waltham, Mass.

But overall, the new system will make it easier for investors to get the best possible prices on stocks, he said.

"It's something that's been long awaited and has a great deal of utility for the industry," said Alper.

But Nasdaq has other problems, including the fact that it is more expensive than the New York Stock Exchange when it comes to buying and selling stocks, according to Barbara Roper, director of investor protection at the Consumer Federation of America in Washington.

"The SEC has approved a system that perpetuates all of the problems that exist in the current marketplace," she said.

An SEC report released Jan. 8 said that Nasdaq investors may be paying as much as 11 ceots per share more than NYSE investors for stocks because spreads (the difference between the price at which an investor places an order and the price at which it is filled) can change rapidly.

Skipping Earlier Orders

One problem, said Roper, is that brokers often fill customers' orders by matching them internally with orders placed by other customers — skipping over individual investors who might have placed orders earlier through ECNs.

SuperMontage, Roper said, just makes this process faster without fixing it.

But Nasdaq spokesman Scott Peterson said that the SEC study compared apples to oranges because Nasdaq lists the stocks of small companies that wouldn't qualify to be listed on the NYSE.

"In our largest securities, our top 50 stocks — which, by the way, represent 53% of all the trading oo the Nasdaq — our spreads were as good as theirs or better," said Peterson.

He added that Nasdaq's spreads have fallen by 75% since 1997 and will continue to drop under the new system.

Other critics of the SuperMontage trading system include ECNs such as New York-based Instinet Corp.

"The implementation of SuperMontage will exacerbate Nasdaq's costly and inefficient trading system," said Instinet spokeswoman Silvia Davi. "But it has come a long way from the original one that was introduced over a year ago."

In September, for example, Nasdaq agreed to do away with a controversial plan to automatically put prices offered through ECNs last on its list of available trades if the private systems charged extra fees to traders. ▶

WORKSTYLES

Speed and Flexibility Are Key for Workers at Cambridge Incubator

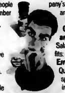
Interviewee: Bill Ditmars, director of network operations

Company: Cambridge Incubator (CI), but a name change was pending as of last Thursday

Main location: Cambridge, Mass.

Number of IT employees: Six in network operations and 10 in applications development

Number of employees (end users): 50; IT also supports about 50 people employed by the member companies.



What It's Like To Work At...

How difficult is IT recruiting? Is the word *incubator* a turnoff? "There have been some challenges with the word. Incubators have not been getting favorable coverage as of late. But we've made several shifts in our business model and have evolved into what we consider a different animal – we call ourselves a technology-based venture creation company. We're more focused on building companies that are 100% CI-owned; it's more of a holding-company model."

How does IT contribute to the business? "Now that we're more focused on creating ideas ourselves and then building a team around those ideas, IT is part of a multidisciplinary team that evaluates new initiatives and assesses how the initiative would develop."

What's unique about working in IT at an incubator? "The fact that you're working with a variety of new and emerging companies, which is always exciting. The IT challenge is to maintain a staff that can rapidly respond to the unique IT requirements of each member company. ... Our network, from a voice and data standpoint, is designed to accommodate rapid growth spurts. We can set up a new member company with very little effort."

Mission-critical systems: "Among the most important are e-mail, calendaring, contact management and document sharing. These enable our member companies to stay in touch with the VCs, business prospects, staff and CI."

Major initiatives: A migration from Windows NT 4.0 to Windows 2000, including an Exchange 2000 upgrade.

Career paths: "One of the opportunities is for someone to move into a member company as the member companies grow. By that time, the CI employee has a solid understanding of what that member company's business is all about and how they can contribute."

Compensation and bonuses: Salary, stock and benefits; no bonus program.

Employee reviews: Quarterly. "We're responsible for supporting our member companies, but our period of engagement is limited. So there's a need for frequent feedback."

Workday: "A typical day is eight to 10 hours, ... about 8:30 to 5:30. ... On the other hand, as member companies reach major milestones, those days can stretch to 12 to 16 hours, with people camping out at ... our co-location center."

Dress code: Business casual to casual.

Kind of offices: "All open space. We have bays with sliding doors that enable you to open one bay to another and expand them as needed."

Decor: "We've been described as 'techno-chic.' We have a lot of transparent walls, as well as ice blues and seafoam green. The bays are open and well-lit, and we have great views of [Boston]. Our CEO has an ergonomically correct Star Trek office chair with a keyboard that's split in half and attached to the arms of the chair."

Must people carry beepers? Cell phones? "We use cell phones that have instant messaging and Web access."

Amenities: A wellness program with occasional on-site yoga classes, tai chi classes and nutritional seminars.

Would employees feel comfortable e-mailing the CEO? "Absolutely."

– Leslie Goff (lgoff@ix.netcom.com)

ED YOURDON

A Recession Guide

HERE'S A SOBERING thought: Most of today's IT professionals haven't been in the field long enough to remember the 1990-91 recession, not to mention the recession of 1982 or the recession of 1973-74. If today's economy does slide into a recession, then a generation weaned on an economic boom may be in for a rude shock.

As someone who has muddled through good times and bad times in the IT industry since the mid-1960s, here are a few words of advice: Remember that people's memories will last much longer than economic peaks and troughs. Most recessions last only a year or two before good times return. But if your organization mistreats its IT professionals during a recession, they will get their revenge when the job market improves. Conversely, if they realize that you've protected them from layoffs, downsizing, salary freezes and other indignities, most of them will reward you with greater loyalty than you might have expected.

Everyone understands that an economic downturn leads to cost-cutting, and employees — in their personal lives — exhibit this behavior just like companies do. Unfortunately, senior management edicts can sometimes be inconsistent and demoralizing, and if employees are already cutting back on their own personal spending, then corporate penny-pinching can be even more annoying. Imagine a company that announces a salary freeze, and imagine the same company putting additional pressure on its IT project managers to finish their development projects as quickly as possible, in order to realize the economic benefits quicker. All this is understandable, but it typically translates into additional overtime for programmers. If those programmers discover that new accounting rules disallow charging an expense-account pizza for a late-night office meal, they're likely to react by turning off their workstations and going home at 5 p.m.

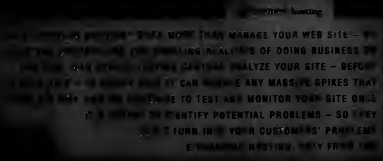
In addition to these penny-pinching morale-busters, managers need to be prepared to fight for project team members who truly deserve raises or bonuses. Sometimes this is impossible. But in most cases, senior managers will make exceptions to a general freeze if persuasive cases can be made. Employees will remember the willingness or unwillingness of their boss to fight the corporate bureaucracy on their behalf, and this is an even more significant issue if layoffs, downsizing and outsourcing decisions are involved. Indeed, the last recession provided countless examples of employees who were forced out by corporate downsizing decisions but who then returned to the same jobs as contractors.

On a larger scale, managers must realize that a recession causes big-ticket IT projects and investments to be deferred, or even canceled in midstream. This can be disheartening even in the best of circumstances, and it's complicated by the political squabbling that occurs when various groups fight over a smaller budget. If you have a team of programmers slaving away in the midst of a project that's threatened with premature termination, it's tempting to keep everyone in the dark until a final decision is made. But chances are that everyone on the team is already aware of the rumors. Indeed, some team members may already be circulating their résumés in order to find new jobs before they're laid off or transferred to boring, dead-end assignments that rob them of the chance to gain experience with the leading-edge technology they're currently using.

All this involves a degree of Machiavellian politics.

All this involves a degree of Machiavellian politics that most boom-economy project managers are completely unfamiliar with. Honest, ethical behavior is the best long-term strategy when confronted with nasty political maneuvers to deprive your project of the resources it needs. But perhaps the most important thing to remember is that coping with these political shenanigans requires time, effort and emotional energy — and for the manager who is already overburdened with the ordinary pressures and responsibilities of running a project, this may turn out to be the largest of all recession impacts. ▮

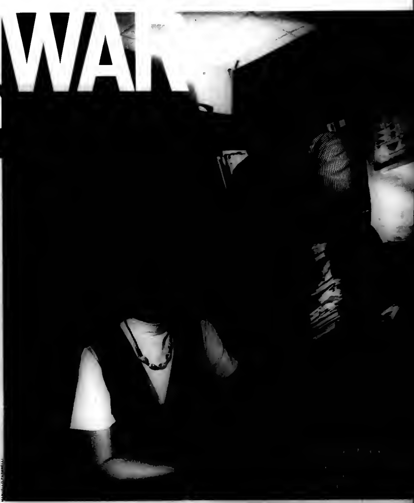
Yourdon is editor of Cutter IT Journal, *published by Cutter Consortium in Arlington, Mass. Contact him at www.yourdon.com.*



Can an **orchestrated cyberattack** wreak havoc throughout the nation's information infrastructure? The **federal government** isn't taking any chances, and it wants the private sector to **prepare for battle.**

By Deborah Radcliff

InfoWAR
G



MANUELLO PAGANELLI

IT'S APRIL FOOL'S DAY, 2002 Glitches in air traffic controller screens nearly cause a collision above New York's LaGuardia Airport. Two weeks later, California Independent System Operator Corp., which controls California's power grid, somehow misplaces an electrical energy order to Southern California Edison, leaving two-thirds of San Diego in the dark. Then in May, a high-power microwave burst fries the electronics at an abortion clinic in Virginia.

Hypothetical "information warfare" (IW) exercises like these are being played out around the country in preparation for what politicians, the military and law enforcement officials fear will be an orchestrated cyberattack on critical U.S. infrastructure companies. The theory goes that if a well-funded, organized series of cyberattacks were to strike at a target's economic and structural nerve centers, it would send the target society into chaos and make it difficult for the military to communicate and move troops.

This particular information war game was played out among 75 IT executives attending an IW workshop at the SANS Institute's Joint Computer Security Conference in Monterey, Calif.

"In the worst-case scenario, every major industry sector would be affected," says Stephen Northcutt, a SANS fellow and a former military IW expert who led the animated workshop at the conference. Note that most of the targets in Northcutt's IW games are private-sector companies.

"When you're talking about information warfare, you're talking about information systems used to cripple the government and economy," says John Tritak, director of the Critical Infrastructure Assurance Office (CIAO) in Washington. "Close to 90% of those critical infrastructure companies are privately owned and operated."

The CIAO, formed in 1998 under presidential directive PDD-63, outlines a national infrastructure protection plan to bring better security and reporting to the telecommunications, transportation, emergency services, energy and financial industries. The directive deems those industries as critical to the nation's operational infrastructure. Although President Bush isn't bound to support the directive, Tritak and others say they hope PDD-63 will remain in effect.

In two years, IW preparedness has moved forward the fastest in the highly regulated and well-organized financial, energy and telecommunications sectors, say Tritak and others. But IT leaders in the private sector say they're hesitant to report incidents to agencies like the CIAO and the FBI. Still, Tritak says the agencies need this information for intelligence and predictive analysis.

While the impact of IW bears the same uncertainty as Y2k, many IW experts say cyberterrorism and cyberwarfare are inevitable. In the past year, hacking hobbyists have shown how easy it is to propagate viruses throughout Internet-connected mail systems. They've also shown they can hack armies of unwitting computers and make those computers do their bidding. Now, the U.S. government is thinking about what terrorists with more resources could accomplish. And so are countries like China and Russia, which are developing their own IW capabilities, according to Richard Power in the book *Tangled Web*.

Moving Mountains

The directive that created the CIAO is a national defense document that, ironically, relies on the private sector to accomplish its mission. Telling that to executives hasn't been easy.

"The concept of information warfare doesn't present a compelling case to the CEO and the board, whose responsibility is to their shareholders and customers," Tritak explains. "But as they begin to see that operating in a reliable and secure business environment is part of taking full advantage of the Information Age, they get it."

To make this business connection, the CIAO recruited a private-sector security expert, Nancy Wong, from San Francisco-based Pacific Gas and Electric Co., to help develop a business-friendly framework and get the message out. Wong soon learned she had a third challenge: keeping government, in its zeal to protect, from crossing constitutional lines between public and private sectors.

"We put in place a road map to identify who are the people who have the most influence in business risk management — financial security analysts, bond raters, corporate executives, even auditors," Wong says. "We're using existing networks by cascading information through their members to the people who communicate it even further."

The networks Wong refers to include industry associations like the Institute of Internal Auditors, the North American Energy Reliability Council and the National Security Telecommunications Advisory Committee.

The CIAO's strategy of taking advantage of existing networks — and their built-in emergency preparedness — helped speed along the formation of the first of two Information Sharing and Analysis Centers (ISAC) for the financial and telecommunications industries. ISACs are privately owned,

Clearly, the eventuality of such an attack is present. That's what motivated [the Clinton] administration to move forward with a national plan.

JOHN TRITAK, DIRECTOR, CRITICAL INFRASTRUCTURE ASSURANCE OFFICE

Anatomy of A Cyberattack

Here's how a computer invader plans and launches an attack on information systems:

1 **Recon** Invader uses information-gathering programs and techniques to sniff traffic at the network gateway, then scans ports for vulnerable services.

2 **Profile Target** Invader gets passwords, then identifies machines and software running on the network.

3 **Attack** Invader gains root or administrative privilege of unclassified systems, then seeks and modifies information.

4 **Cover Tracks** Invader hides the evidence trail and slips away.

5 **Wait for Results** Invader watches CNN to see what damage he wrought.

"The weak areas [of the above scenario] are in predicting when someone is gathering information for a later attack. And, once we've been attacked, the problem is in recovery," says Dennis McCallam, senior technologist at Herndon, Va.-based Logicon Inc., the IT contracting division of Los Angeles-based defense contractor Northrop Grumman Corp.

For the past year, Logicon has been working with the Air Force Research Laboratory (AFRL) in Rome, N.Y., to develop real-time analysis and recovery capability.

The result is something they call the resilient network: intuitive data hiding and recovery agents that will recognize when key data is erased or replaced with bogus data. Then that data or computational process is replaced with the untouched version, and the administrator is alerted.

The administrator starts by specifying the most essential data or processes that need protection – say air traffic patterns that, if interrupted, could lead to a collision or crash. The agents then camouflage the data by hiding it under fake file names and fake extensions in unlikely places on the network. At the first sign of data destruction or unauthorized tampering, the agent follows its path back to the clean data, copies and replaces it and alerts administrators.

"Our work represents a new vision in information infrastructure command and control that goes way beyond the protect-and-detect technologies [such as firewalls and intrusion detection systems] that came out in the '80s and '90s," says Joe Giordano, technical adviser to the AFRL. "This is active response, the linchpin to active forensics and protection."

Researchers are working on ways to tie the algorithm into other technologies also in research, including advanced forensics and a tracking system to follow a live evidence trail.

Don't be surprised if these algorithms eventually wind up in the private sector.

The AFRL developed the first intrusion detection algorithm, which spun out to the private sector when several former Air Force researchers founded the first intrusion detection company, WheelGroup, which was later acquired by San Jose-based Cisco Systems Inc.

– Deborah Radcliff

InfoWAR Games

industry-specific cooperatives through which the government plans to channel warnings out to the private sector. The government also plans to use ISACs to gather intelligence it needs to better predict an orchestrated attack.

Energy and technology centers are expected to be completed by the end of March. The long-standing emergency management methodologies and collaborative networks provide the framework for these infrastructure analysis and reporting structures.

Bruce Moulton, vice president of infrastructure risk management at Boston-based Fidelity Investments, explains, "If a failure occurs in the Northwest power grid, for example, the energy sector has processes to keep that power failure from rippling across the United States."

And because its core business is consumer trust, the financial services industry has particular impetus for security and disaster planning, says Moulton, who chairs the financial services ISAC. "We've already got a good framework of controls to protect against disruption and customer privacy violations," he adds.

A Matter of Trust

But the biggest problem with this infrastructure plan is that businesses have a hard time visualizing the return on investment in risking corporate privacy by reporting breaches.

"The risks in reporting are clear: the fear of negative publicity, proprietary information shared in court, loss of public confidence or reduced trust in the economy itself," Harris Miller, president of the Information Technology Association of America, told an infrastructure panel last month at SafeNet 2000.

The question of reporting was one of the most nettlesome issues tossed around at SafeNet, where leading privacy and security professionals, educators, vendors and infrastructure companies met with government infrastructure protection heavyweights at Microsoft Corp.'s conference center in Redmond, Wash.

Meanwhile, industry leaders are awaiting the passage of a House bill, the Cybersecurity Information Act, that would reduce liability and antitrust action, along with actions brought under the Freedom of Information Act that are related to cyberinformation sharing.

Who Responds?

Such complexities spotlight the precarious relationships being forged among defense agencies, law enforcement bodies and the private sector, which all have stakes in the national infrastructure. On top of that, there's the sticky issue of jurisdiction.

Who responds to an orchestrated attack, particularly one that affects military operations and crosses state lines? The answer differs from region to region. But, absent a declaration of martial law, it wouldn't be the military.

"When we're at war, we just go blow up the bad guys. But domestically, our mission is different. We can't trespass [into private systems] when we chase the bad guys. And we can't blow up the bad guys, because the bad guys are an unknown," explained Jim Christy, a supervisory special agent at the Defense Department's Information Assurance Office, to a group of 400 officials at a state summit on cybercrime in Mesa, Ariz., in October.

So the burden of responding to private-sector calls for help will most likely fall to the FBI's InfraGard program, which itself is fishing for intelligence from corporations and private citizens. Many IT leaders say they don't trust the agency, especially given its poor sensitivity to business issues, including efforts to limit encryption exports, and most recently, its controversial Carnivore e-mail wiretapping system.

The NSA Wants You!

The National Security Agency (NSA) says it wants colleges to graduate IT professionals who are ready to "enter the workforce better equipped to meet challenges facing our national information infrastructure." So it sponsored an outreach program called Centers of Academic Excellence in Information Assurance and Education.

As of October, 14 schools had achieved this designation, including Carnegie Mellon University, James Madison University, George Mason University, Purdue University, Stanford University, the Naval Postgraduate School and several state universities, including Florida State, Idaho State and Iowa State.

Many other institutions – such as Syracuse University in New York – are in the process of applying for this designation. The only problem is that it seems as though foreign countries are reaping more benefit from this program than the U.S. At Syracuse, for example, nearly all the computer science students are foreigners. A look into master's dissertations at Syracuse's Internet Security Principals course in November turned up only one U.S. citizen out of 37 students. The remaining 36 were from the Middle East and Pacific Rim countries.

– Deborah Radcliff

Meanwhile, Arizona has unveiled perhaps the most unusual plan on the drawing board today: Make the Air Force National Guard the nerve center for private-sector reporting and response, an idea that comes from Christy and Republican State Rep. Wes Marsh, who's also a member of the Air Force Reserve. Marsh says that because members of the National Guard work full time in the private sector, they'd make excellent liaisons between the government and private sector.

Better Today

No matter how you look at these issues, the net result of the presidential directive is that security awareness is rising, ISACs are forming and executives are more clued in. In spite of raised awareness, internal and external cyberthreats continue to rise, according to a joint survey by the FBI and the San Francisco-based Computer Security Institute. And, in a nonscientific online poll by *Computerworld* last month, only 17% of 150 respondents said their companies were prepared to respond to an orchestrated, warlike cyberattack.

But is this work moving fast enough? "This is a race. If the industry doesn't learn to manage its risk in a prudent way and something like an *Exxon Valdez* happens, then you'll see a chilling effect as laws get passed during the crisis," says Tritak. "At the same time, if you try to overplay the risks and threats, you could lose your audience."

Already, international IW efforts are moving forward.

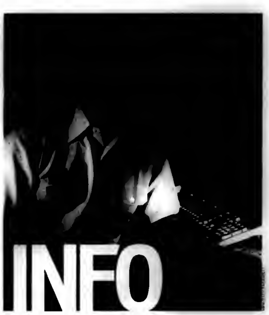
The U.S. military has publicly announced the formation of IW units. Cyberclashes between Israeli and Palestinian factions that shut down Israeli and Palestinian government Web sites prompted the FBI to issue a warning to American businesses in October. In December, the FBI issued another warning of an "increase in hacker activity specifically targeting U.S. systems associated with e-commerce."

Yet in spite of these indicators, IW thinkers say a cyberwar is years away.

"Clearly, the eventuality of such an attack is present. That's what motivated [the Clinton] administration to move forward with a national plan," says Tritak. "But I don't think anyone has the cybercapability today to launch an attack that would cripple the nation's infrastructure. [The presidential directive] predicts such a scenario is still years away." ▶

MOREONLINE

For deeper discussions of information security, turn to the Security Watch section of our online communities at www.computerworld.com/security



The INFO Warrior

If the **future of warfare** will be largely digital, then **frontline troops** will increasingly be those technologists who blend **IT capabilities** and military strategies. It's a role well-suited to **Maj. Marcus Sachs** (right) and Mark Duck, among the country's advance guard in this new **field of battle.**

By Deborah Radcliff

MARK SACHS, a U.S. Army major with battlefield network engineering experience, explains his newest mission this way: "We understand that one of the commodities we have to move is information — not just fuel, equipment and soldiers. That information movement requires an infrastructure. And security of the information inside that infrastructure is a big concern."

At the end of 1999, Sachs became an operations analyst at the newly organized Joint Task Force for Computer Network Defense in Arlington, Va., an assignment given to him just after he finished government-sponsored graduate school at the University of Texas at Austin.

Washington is the nerve center for those U.S. military networks put into the task force's care: the Army, Navy, Marine Corps, Air Force and a dozen other agencies, such as the National Security Agency, Defense Finance and Accounting Service, Defense Logistics Agency and Defense Information Systems Agency (the Department of Defense's backbone support network). In essence, the Computer Network Defense task force has been charged with protecting more than 3.5 million DOD computers.

Sachs works the analytical side of the task force. The other side is the watch team. The watch team monitors DOD computers for problems, abnormalities and intrusions both within and outside DOD networks — such as the distributed denial-of-service (DDOS) attacks that took down the Web sites of Yahoo Inc., Amazon.com Inc. and eBay Inc. early last year. "We observed the DDOS activity hour by hour, because if a problem arises somewhere else on the Internet, it may eventually affect us," Sachs says.

The Info Warrior's Job

The U.S. military first experimented with information warfare in Operation Desert Shield, when it disrupted Iraqi military communications. But the job of an information warrior didn't become official until October 1999, when, at the behest of a presidential directive, the Computer Network Defense and Computer Network Attack missions were formed under the U.S. Space Command at Peterson Air Force Base, Colo.

With titles like operations analyst, electronic engineer and chief of communications and computer systems, information warriors develop and operate computer-based offenses and defenses.

– Deborah Radcliff

While the watch group gathers data from its network traffic, outside commercial emergency advisories and news reports, the analysis team to which Sachs belongs is tasked with figuring out what to do with that information.

"If the watch reports something wrong — an intrusion or whatever — we then make an assessment of whether there is or isn't an operational impact on the Department of Defense," Sachs explains.

Sachs hasn't been on the job long enough to chase down any serious attack on DOD systems yet. But Mark Duck has. As an early information warrior in 1994, Duck took a job as network manager at Air Force Research Laboratory, known then as Rome Labs, in Rome, N.Y. In so doing, he stepped right into an attack on the Air Force Research Lab network.

Duck noticed that several of the lab's servers had been compromised at root level, and he made a phone call that helped launch the biggest computer crime investigation in military history. It spread to more than 100 downstream computers, including Air Force contracting agencies, NASA's Jet Propulsion Laboratory and even the South Korean Atomic Research Institute.

"I'm the first line of defense," says Duck, who's now IT enterprise director at the Air Force Research Laboratory at Kirtland Air Force Base in New Mexico. As such, he blocks and tracks numerous attacks on the lab's network. Duck also spends a lot of time on employee education. "A week after a tutorial on e-mail viruses, I embedded a virus in JavaScript and sent it anonymously to our 1,200 users," he says. "The virus secretly redirected those who click the attachment to 'MyEvilWebSite.com,' which had a note reminding them they shouldn't open unsolicited attachments. Within seven minutes, 154 of my users had been registered at that site."

The exciting work and ability to learn new skills has kept Duck in military civil service for almost seven years and has kept Sachs enlisted for almost 20 years. But both plan to move to the private sector in the next year.

"The private sector is also under information warfare attack," Duck says. "It's just different. Instead of actual war, they have to worry about espionage and liability." ▶

Hands Off My Staff!

Aggressive technical recruiters can through your firewalls to access jus and anyone – they want. Here's a ru do it and how you can stop them. By

THEY'RE OUT THERE Everywhere. And they want your IT employees.

Just ask Mark Roachell, technical recruiter at Kaiser Permanente Health Plan Inc.'s Information Technology Division in Pasadena, Calif. He's one of "them," a recruiter who uses sophisticated Internet search methods to scout potential job candidates.

"I don't consider myself very aggressive," Roachell says. "But the information I find on the Web is very interesting."

Apparently so. That information, he says, includes corporate employee directories, personal résumés, staff names and phone numbers.

If a laid-back recruiter can find all that data on the Web, rest assured that those who are out to openly raid your IT staff are finding lots more.

Consider the mind-set involved: "You have to be a shark, constantly on the prowl," says Dan Harris, CEO and senior trainer at Recruiters Dream Network in Arlington, Texas.

The quarry that aggressive recruiters hunt these days are the so-called passive candidates — those IT employees who aren't looking for a new job but who might be enticed away with the right offer.

"A skilled recruiter's job is to create a problem where one may not exist," says Harris. He says good Internet recruiters can match a potential candidate to a position and present it as a dream job. "If the recruiter doesn't come across like a used-car salesman, a reasonable person will listen to a reasonable offer," he says.

Defense Mechanisms

How can an IT organization defend itself against such a reasonable approach to employee poaching?

Some companies are trying technology-based defenses, with only limited success, say Internet recruiters. One recruiter, who asked not to be named, says a company hired him to identify employment-related Web sites. The company then programmed its firewall to block incoming e-mail from those sites — all 36,000 of them.

Many Internet recruiters say such efforts are wasted, because they'll get to your IT staffers at home if they can't reach them at work.

"Technical protection costs you time, money and effort that you could invest in building synergies between your company and employees so that they don't read solicitations from recruiters," says Gerry Crispin, chief navigator at CareerXroads, an international employment consulting firm in Kendall Park, N.J.

Even stashing employee data behind firewalls isn't a sure safeguard. Savvy Internet recruiters find such information in news articles, white papers, industry association member lists and technology groups.

"It's very difficult for a company to

regulate individuals' names on the Web in any meaningful way," says Bill Craib, director of training at Advanced Internet Recruitment Strategies (AIRS) in Hanover, N.H.

If You Can't Beat Them . . .

Instead of fending off Internet recruiters, IT organizations are increasingly joining them by having their in-house IT recruiters learn Internet recruiting tactics. Craib estimates that approximately 75% of his students are from corporate IT recruiting staffs. Scott G.T. Sloan, director of IT recruiting at Citadel Investment Group LLC in Chicago, is a graduate of the AIRS course.

"I love Internet recruiting," says Sloan. His favorite tactic is data mining competitors' and industry conference Web sites for candidates. "It's cost-effective and makes it easy for me to find the résumés of difficult-to-find people in a relatively short time."

Some of the résumés that Sloan and other internal recruiters find belong to their current IT employees. When that happens, they say, the smartest response is to approach the employee to find out whether there's a job or management issue they can address.

"Keep an open door," advises Sloan, who promises confidentiality to IT employees who bring their troubles to him if they aren't comfortable talking to their managers.

Satisfaction Means Staying Power

In fact, aggressive recruiters say job satisfaction is their biggest obstacle to luring away IT employees.

"It is impossible to poach happy employees," says Barbara Ling, president of RISE Internet Recruiting Seminars in Pelham, N.Y. "Companies should be emphasizing retention."

Keeping IT employees happy isn't a simple proposition. Recruiters say paying market-rate salaries is key — a hard lesson learned by Kaiser after approximately half of its networking employees left the company last year. A market salary survey showed that while networking position salaries in general had increased 20% to 25% in the past two years, Kaiser's had gone up only 6% to 8%.

Kaiser raised the salaries of the entire networking team by 15% to bring them in line with industry norms, says Roachell.

But money is only part of the satisfaction equation. Kaiser also tries to offer reasonable work hours, give people time off with their families, foster a diverse work culture and provide extensive training programs that range from Microsoft and Cisco certifications to a new Web Academy for IT staff who want to learn new skills. All those things, plus good salaries, add up to considerable job satisfaction, says Roachell.

Companies that build strong relationships with their IT employees will do better at fending off Internet recruiting tactics, say recruiters. They also point out that Internet search methods alone can't lead to successfully recruiting a candidate away from another IT organization.

"It's all about relationships and keeping the best interests of the employer and candidate at heart," says Sloan. "If you're a bad recruiter to begin with, the Internet won't help you." ◗

Watson is a freelance writer in Chicago.

ind their way
about anything –
down on how they
Sharon Watson

Online Tactics Demystified

To identify potential job candidates, Internet recruiters run complex search strings on the same search engines that are available to anyone with Web access: Yahoo, Google, AltaVista and others.

These techniques are often so tedious that many recruiting firms and human resources departments are now employing Internet "sourcers," who do nothing but run such searches to pull up names for further vetting by recruiters.

Many recruiting consultants teach these techniques, often with slight variations. While different firms may apply different labels to them, the following are the most popular basic search types and possible defenses:

FLIPPING AND X-RAYING
To "flip" a Web site means to find all other Web links attached to the site, especially those that are hidden from view and that aren't behind a firewall. Once recruiters find those sites, they "X-ray" them to find employees' home pages, employee or project directories or other sites listing IT personnel.

Defense: Put employee contact information behind firewalls. Don't let employees link personal Web pages to your corporate site.

PEELING OR STRIPPING
Aggressive recruiters "peel" Web addresses that come up on a keyword search, stripping back each hyperlink in an address until they reach a Web page with potential contact data. This technique thwarts companies that hide directories behind nonsense Web addresses.

Defense: Put sensitive links behind firewalls.

HARVESTING OR MINING
Once recruiters find an employee list, they use "harvesting" or mining tools to scour it for prospects. The use of intelligent agent software that can grab e-mail addresses based on certain criteria is increasing.

Defense: Don't put employee e-mail addresses or other contact data on public Web sites.

PEER SEARCHING
"If we can find one person, we can find them all," says Bill Craib, director of training at AIRS. Recruiters say that by identifying one person with a specific IT skill set, they can use that information to track down his colleagues, fellow association members and others.

Defense: Difficult. Many recruiters say they first identify a key person from news articles, white papers and industry association member lists.

ANCHOR SEARCH
An "anchor search" is a basic keyword search on a domain, using such words and phrases as *biography*, *résumé* and *meet our team*.

Defense: Difficult, unless the Web site contains absolutely no personal — or professional — data about any employee.

E-MAIL
Aggressive recruiters say they avoid sending mass e-mails because it usually aggravates potential candidates. Once they have done their homework, however, recruiters will send personal e-mails to candidates at work or at home.

Defense: Some companies have tried blocking mail from employment-related domains. But recruiters say they will get to your people at home if they can't reach them at work.

EMERGING TACTICS
Internet recruiters are willing to run increasingly abstract searches in the hopes of gleaning information that will lead to great candidates. Judy West, author of *Cyberspace: Jealously Guarded Recruiting Secrets*, talks about searching Web sites for Acrobat files and embedded scripts and applets to gain access to employee directories and user groups.

Defense: "Your only defense is not to put this information out there," West says. "If it's in the public domain, we'll find it."

Internet Recruiting Resources: The following Web sites contain information about Internet recruiting books, tools and seminars:

- *www.airsdirectory.com*
- *www.careerxroads.com*
- *www.cyberrecruitingsecrets.com*
- *www.riseway.com*

HOW TO HIRE AN H-1B

Now, twice as many foreign workers can obtain H-1B visas annually, and that's setting off a race to find them. Consider the experiences of companies that routinely use H-1B workers to round out their IT departments.

By Emily Leinfuss

Ask Debbie Kaylor what the best things about hiring foreign national technology workers under the H-1B visa program are, and she quickly cites cultural exchange and "really great Indian dinners."

On further reflection, Kaylor, a recruiting manager at Extended Systems Inc., a software development firm in Boise, Idaho, says the real advantage, obviously, is getting skilled technology workers during a time of great shortage.

With the near doubling this year of the number of H-1B workers that can be sponsored annually, Kaylor says, many IT managers will soon be discovering this source of IT labor for the first time. The intense competition for those visas by sponsoring companies and the time involved in getting an application approved puts the burden on IT managers to learn the process quickly.

"You learn a lot going through the process, but my advice is to use an attorney and not to risk making mistakes like filling out the form wrong and getting it sent back," Kaylor says.

In fact, communication, tenacity and good legal counsel — not to mention a multinational approach to hiring — are the best assets to have when using the H-1B visa program to fill technical positions.

Take MasterCard International Inc. in Purchase, N.Y., for example. The financial services firm has a decentralized organizational structure, with IT staff at home locations in Belgium, India and Australia. It also has a long-term relationship with Chennai, India-based contract management firm Mascon Global Ltd. This approach ensures that the majority of MasterCard's H-1B hires are already working for the firm, either at the remote centers or as contract employees.

MasterCard's partnership with Mascon helps it fill in the gaps with temporary and contract help during the H-1B approval process, says Rob Reeg, senior vice president of systems development at MasterCard. It usually takes six to nine weeks for approval of an H-1B application, he says.

The jobs that MasterCard uses H-1B workers to fill range from working on maintenance enhancement projects to helping rewrite core transaction-processing systems.

"We look for programming skills, C++, Java, HTML, database administrators and management systems programmers," says Carolyn Koenig, MasterCard's senior vice president of human resources.

The Approval Process

It's far easier for applicants with advanced degrees to get H-1B visas, says Koenig. H-1B candidates are generally highly educated and fill skilled positions. And because MasterCard's centers serve customers who represent 27 languages, multiple language skills are a definite plus, she says.

Once a candidate is targeted — meaning he goes through the same interview process any other hire does and meets the qualifications for the job — his visa status is addressed. The total cost of sponsorship is approximately $5,000, Koenig says.

The H-1B application process is laborious, so Koenig recommends using a legal firm that specializes in the process.

"You can miss one question or not answer something appropriately, and it will get sent back, and you have doubled the time it takes," she explains.

Waiting for visa approval can be a source of anxiety for applicants. One software engineer from India who works at SAS Institute Inc. in Cary, N.C., came to the U.S. 12 years ago and has worked at three companies since then. His first eight years were on an F1 (student) visa, and the past four years were on an H-1B. This foreign national worker had to get a new H-1B visa for each of his two earlier jobs.

"One firm was purchased by another, and the project I was working on was eliminated," so he needed a new job, the worker explains. But the waiting process for the H-1B was stressful, he says.

"The dynamic of the job situation, where companies are restructuring all the time, makes it seem like you don't know what is going to happen tomorrow. If you are on an H-1B visa, then you can be left without anything to hang on to. You can get another job, but the process takes a long time," he says.

Assimilation, adjustment and differences in culture all come into play when settling an H-1B visa holder into a job, says Koenig. Some of the hardest things to work out are the cultural differences.

That's why MasterCard has a relocation program that addresses family concerns, advising foreign employees on how to apply for a driver's license and other typical procedures. Reeg also employs a buddy system on the job, matching newcomers with people of the same nationality to help answer questions.

Easing Transitions

The new regulations governing H-1B visas that were approved last year appear to have addressed the problem of waiting time and some of the other troublesome aspects of the program.

The new regulations offer workers the ability to change jobs more easily, says David E. Yurkofsky, co-chairman of the Continuing Legal Education Committee of the New York chapter of the Washington-based American Immigration Lawyers Association. They also eliminate the requirement of filing an amended H-1B petition in many corporate restructuring situations, extend H-1B status beyond six years and let green-card applicants change employers.

And it's the green card that's the brass ring for many H-1B visa holders and employers, especially after they make the investment in relocation and training, says Jeff Chambers, director of human resources at SAS Institute.

"We have converted a lot of H-1B visa holders to permanent residence after they work out on the job," he says. ◗

Leinfuss is a freelance writer in Sarasota, Fla.

TIPS FOR H-1B HIRING

What happens after the hiring manager identifies a foreign national job candidate and wants to hire him? Here are some tips from David E. Yurkofsky, co-chairman of the Continuing Legal Education Committee of the New York chapter of the Washington-based American Immigration Lawyers Association:

- Make sure it's a job that requires a four-year college degree. If other workers doing the job didn't have college degrees at the time they were hired (or the mandated equivalent of 12 years' work experience), it is, by definition, not an H-1B position.
- Ensure that the job is paying the prevailing wage. This means checking the proposed wage against labor department statistics for the occupation and geographic region of the U.S. or, if those figures aren't available, conducting an independent survey.
- Use the Department of Labor's fax-back system to obtain an approved labor-condition application.

ALSO NOTE:

- A company can't hire someone until his H-1B is approved.
- If the candidate was already working through an H-1B visa at another company in a similar type of job, he can begin working at the new job as soon as the application has been filed.
- Other filing requirements and frequently asked questions are available online at the Immigration and Naturalization Service's Web site: **www.ins.usdoj.gov**.

BUSINESSQUICKSTUDY

FINANCIAL & BUSINESS CONCEPTS IN BRIEF

Service-Level Agreements

DEFINITION

A **service-level agreement** is a contract that defines the technical support or business parameters that an application service provider or other IT outsourcing firm will provide its clients. The agreement typically spells out measures for performance and consequences for failure.

BY DAWNE SHAND

WORKING with an application service provider (ASP) can be a risky proposition, especially for established companies that entrust the care and management of core business applications to small or emerging companies. How can you ensure an ASP will perform well, respond quickly to problems or perform regular maintenance checks?

In its march toward becoming a legitimate and permanent fixture in the IT outsourcing landscape, the ASP industry has promulgated service-level agreements (SLA) as a means of mitigating these concerns. An SLA provides some assurance that ASPs will support their customers' business and technical objectives.

Critical Enabler

Last spring, the American Cancer Society Inc. (ACS) in Atlanta decided to find an ASP to host its Siebel Systems Inc. customer relationship management system.

CIO Zachary Patterson says he believed that the ASP model would free his organization from IT delivery, since technology isn't the organization's core business but is a critical enabler. "We were mainly concerned with hosting at the beginning; now I would rent the application," he notes.

Patterson says he decided to take a new approach with ACS's technology vendors: He wanted them to become partners with the nonprofit organization. The SLA ACS reached last fall with Annapolis, Md.-based USinternetworking Inc. to host the Siebel suite would be one step in that process.

The SLA is an "ongoing learning experience" for both ACS and Patterson's team, he notes. The nonprofit group needed an SLA tailored to its business' needs, which Patterson defines as 99.99% availability of its enterprisewide applications. "We are aiming for perfection," he says, but the organization's mission — to find cures for cancer — compels it to strive for nothing less.

ACS's top priority, says Patterson, is customer satisfaction, and its SLA reflects this business imperative. As Patterson says, "Uptime on a router means nothing to a business." Patterson worked hard to make certain that USinternetworking understood what ACS's service meant to its cancer patients, volunteers and donors.

This doesn't mean that his organization's SLA doesn't address finer technical details, explains Patterson. For instance, ACS does measure performance metrics such as availability of e-mail services. However, the SLA's overriding goal — and its relationship with the ASP — is the business prerogative of service.

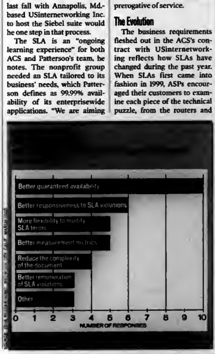
The Evolution

The business requirements fleshed out in the ACS's contract with USinternetworking reflects how SLAs have changed during the past year. When SLAs first came into fashion in 1999, ASPs encouraged their customers to examine each piece of the technical puzzle, from the routers and servers to leased lines and storage systems. Then, the customers would weigh the overall importance of each area and decide how much uptime would be necessary.

Most ASPs promised 99.9% uptime. Although the math appears fuzzy and the second decimal place unimportant, 99.99% reliability means only five minutes of downtime per month, while 99.95% availability allows for 45 minutes of downtime. For certain applications — especially given the vulnerability of the hardware that they run on — it's completely unrealistic to tell a customer that it will be down for only five minutes per month.

These days, most SLAs focus on business requirements. SLAs were historically "negotiated for one piece, such as an SLA on network performance," explains Jay Seaton, vice president of marketing at NaviSite Inc., an ASP in Andover, Mass. "Customers now ask, 'What about the server? If it goes down, I'm also out of business.' Ideally, customers should look for comprehensive SLAs."

The business objective, such as response time or problem resolution, should take precedence over specific technical metrics, he adds.



'Weasel Words'

A second point of contention with SLAs is what David Caruso, a vice president at AMR Research Inc. in Boston, refers to as "teeth." ASPs have to feel some pain for falling down on the job, says Caruso. Typically, when an ASP doesn't meet its performance agreement, it pays the customer in either additional service or dollar credits. "I've seen some weasel words in these SLAs," Caruso notes. "For example, one SLA guaranteed 99.9% uptime but didn't count the first 15 minutes of downtime."

Caruso says customers are starting to think more about "windows of performance." For example, 15 minutes of downtime during peak buying hours represents a huge problem for online retailers, but 15 minutes of downtime at 2:00 a.m. probably has fewer consequences.

There's now a greater effort to think through — and specify in the SLA — when maintenance activities are performed to avoid interfering with the business. Customers and ASPs can differentiate between uptime and performance levels. The SLA should reflect these business requirements.

However, Caruso says he has also seen SLAs that have been too detailed. "Companies should focus on specifying the mission-critical activities," such as uptime or performance, he says.

Patterson makes the following recommendations for companies that are negotiating an SLA: "The SLA should be clear and free from complex language. It should be tightly focused on business needs."

In other words, avoid the weasel language. ■

> The SLA should be clear and free from complex language. It should be tightly focused on business needs.
>
> ZACHARY PATTERSON, CIO, AMERICAN CANCER SOCIETY

Shand is a freelance writer in Somerville, Mass. Contact her at dshand@netway.com.

■ *Are there business terms you would like to learn about in QuickStudy? Please send your ideas to quickstudy@computerworld.com.*

business
here.

Dear Career Adviser:

I am a Macintosh professional who has worked on Web development for entertainment and multimedia sites. I am interested in streaming media and I'm wondering whether, as a Macintosh person, I am at an advantage or disadvantage to grow my career at a business-oriented company that seems to be more stable? What skills and applications do I need to emphasize in my résumé, and what should I look for in terms of compensation?

— MEDIA MAVEN

Dear Maven:

A company that is more business-oriented may have less demanding streaming media needs than an entertainment company, says Bill Luciw, a Palo Alto, Calif.-based digital multimedia consultant and founder of Fovea Studios, a fine art photography studio.

But if streaming media is your bag, as a Macintosh person your key skills should involve QuickTime, the centerpiece of Apple's multimedia technology; RealNetworks' RealServer technology; and Macromedia Flash, which Luciw deems a great solution for high-impact Web multimedia with short sound effects and loops, especially animations.

Luciw says QuickTime Flash and RealServer are the cornerstone applications for streaming media content creation.

But perhaps more valuable to an employer than your software knowledge will be your understanding of the various media formats and how they differ in quality and space savings via compression technology. This level of understanding is what will showcase your skills.

There are many content creation and editing toois that can output results in these various formats. Knowing which formats are optimal in terms of size and quality trade-offs is your value-add for building successful streaming Web sites. With both the qualitative judgment and the hard-core technology skills under your belt, count on annual Bay area earnings, for example, of between $70,000 and $90,000.

Dear Career Adviser:

I've been asked to take a job as a lead engineer of an IT project team in an NT, datacommunications and telecom environment. What do I need to do to help organize the team and define job descriptions, tasks and targets? I know this is a significant opportunity for me to advance my career. But I also need to identify areas for improving my own skills.

— DEEP WATER

Dear Deep:

Start by learning some project management theory, including concepts such as work breakdown structure, Gantt charts and program evaluation and review technique charts, advises Ryan Kish, director of marketing communications at Sterling, Va.-based AEC Software. AEC is a provider of Fast-Track Schedule, a cross-platform project scheduling package that operates in Macintosh and Windows environments as well as on handhelds. This will let you walk the walk and talk the talk of your new position.

Then, get down to brass tacks by writing a mission statement and defining your project, its associated tasks, the people on your team and your project's customers. This can be a tricky process, particularly if pre-existing commitments to other groups cloud your project's start, or you are unsure of who the customers are or who owns each project task.

Additionally, do your homework to select the software package that will help you schedule, track and manage the plethora of activities, costs, people, functional specs for every major and minor task and schedules for each deliverable.

There's a list of project management packages covering software development, time and labor costs and team collaboration — including Web-based teams — at *www.infogoal.com/pmc/pmcswr.htm.*

FRAN QUITTEL is an expert in high-tech careers and recruitment. Send questions to her at www.computerworld.com/career_advisor.

Readers Write:

Career Advisor recently cautioned Nervous not to relinquish dot-com compensation gains if he had the right credentials. Not everyone agreed. One reader wrote:

Nervous was a four-year MCSE who was reluctant to take a pay cut after being laid off from a start-up. But he may have been making more than he was worth, and that could have even been the unwritten reason for the layoff. Management of the start-up may have made many bad decisions, including about compensation levels. If Nervous has good skills, he shouldn't worry so much about the future but just get in the door of a great organization, where recognition and compensation will follow. Nervous sounds like a whiner who got spoiled in the temporary dot-com/start-up flare-ups.

— SALT LAKE CITY CIO ◗

BRIEFS

Feds Testing E-Mail Monitoring Software

The U.S. Department of Energy (DOE) has confirmed that it's running a six-month test of new e-mail monitoring software at four national laboratories. The software could be used to enforce current guidelines for communications regarding nuclear technology and to check for security violations.

Despite reports that the software will be used to monitor communications with foreigners and foreign nationals living in the U.S. following the Wen Ho Lee case, a DOE spokeswoman said that there's no particular target during the tests. The software will be used to monitor all types of communication regarding the nuclear programs, she said. The tests will run at four laboratories: Sandia and Los Alamos in New Mexico; Lawrence Livermore in California; and Pacific Northwest in Richland, Wash., the spokeswoman said. The software captures e-mail, filters out irrelevant messages and sends those that are suspicious to a counterintelligence unit.

FTC Seminar to Cover Online Retail Rules

The Federal Trade Commission (FTC) plans to hold a seminar this month to help ensure that online retailers understand and comply with its business rules. The seminar, to be held Jan. 30 in Tysons Corner, Va., will cover regulations that include order-fulfillment expectations, advertising requirements and privacy issues, according to the FTC.

The seminar comes two months after the commission warned or fined more than 100 online retailers for making holiday shipping promises they couldn't keep during 1999 and 2000, though an FTC spokesman said most retailers improved last year.

Report: Firms Lacking Global Online Plans

Despite expectations of a huge boom in online users abroad, U.S. companies still aren't targeting those markets, according to a report by Jupiter Research in New York. "Of the top 20 Web sites within five categories (shopping, travel, search engine and portals, news, marketing and corporate), two-thirds of U.S. companies have not yet prepared for a global online marketplace," the report stated. The report suggests that companies trying to globalize should align with local companies to gain an understanding of local customs, delivery capabilities and business practices.

ETrade to Purchase Online Mortgage Firm

ETrade Group Inc. in Menlo Park, Calif., has announced that it will buy Huntington, Calif.-based LoansDirect Inc., one of the nation's largest online mortgage originators. The mortgage service will be added to ETrade's banking and brokerage offerings. LoansDirect is a virtual lender that's licensed in 47 states.

FedEx Signs Deal to Upgrade POS Systems

Memphis-based FedEx Corp. last week signed a three-year, $27 million contract with Austin, Texas-based Wincor Nixdorf LLC for the installation, integration and support of point-of-sale systems in 1,100 FedEx World Service Centers in the U.S. The new systems "will supply our employees with more real-time information, including tracking and tracing of packages, but also information such as international shipping requirements," said a FedEx spokeswoman.

Job Moves

WALTER C. ZERRENNER, 59, has been named senior vice president and CIO at New York-Presbyterian Hospital and Healthcare System in New York. He was formerly president of IT consulting firm Zerrenner & Associates Inc. in Indianapolis . . . JOHN KIM, 40, was named CEO of BondBook LLC, an online bond trading marketplace in New York. Kim was formerly CEO, president and CIO at Aeltus Investment Management Inc. in Hartford, Conn.

TECHNOLOGY

DATACENTER: BEHIND THE SPECS

Microsoft's Datacenter Server enterprise operating system includes features the vendor says make it worthy of hosting enterprise applications. But is Datacenter really ready for prime time? *Computerworld* spoke with Microsoft's Peter Conway about the substance behind the specs. ▸ **58**

SECURITY JOURNAL

Security manager Jude Thaddeus ponders how his firm should adapt to new laws that enable government surveillance and that govern how companies can use data about individuals. ▸ **59**

EXEC TECH

Our resident gadget guy, reviews editor Russell Kay, is in paradise this week at the Consumer Electronics Show, with about a zillion high-tech toys to ponder and play with. Some of these products and technologies are powerful and far-reaching, while others use technology in some weird and wacky ways. ▸ **60**

FUTURE WATCH

LifeFX, a small company in suburban Boston, has achieved a goal that has so far eluded even the mightiest of Hollywood special-effects studios: It's created a believable digital 3-D human. More than a novelty, it could be the key to new human-to-machine interfaces. ▸ **61**

THE STORAGE CHALLENGE

Users have hoped that by throwing away a mix of existing storage systems and consolidating on new, homogeneous ones, their storage management problems will improve. Many headaches do go away, they say, but global management of the storage infrastructure remains a challenge. ▸ **66**

QUICKSTUDY

Computers don't understand English or even programming languages. What's needed is translation software, and it comes in different forms: compilers, interpreters and bytecode. Learn more about this software in this week's primer. ▸ **68**

EMERGING COMPANIES

Looking for processing power? Blackstone Technology Group aggregates PCs into compute farms, using its software and services to make high-end computing power available for processor-intensive applications. ▸ **70**

JOB WATCH

In her new role as information architect at GoTo Auctions, Amber Link relies on her background in the editorial realm — not IT — to design Web sites that reflect how readers like to experience and process information. We profile Link as one of a new breed of the Web's master builders. ▸ **71**

IS EXCHANGE WORTH IT?

MICROSOFT'S EXCHANGE 2000 SERVER offers new bells and whistles that take the application well beyond its e-mail roots. It also offers many meat-and-potatoes improvements that administrators have been requesting. But it's the first Microsoft application to require Active Directory — an upgrade likely to force major infrastructure changes. Are the new features worth the effort?

62

BRIEFS

Tripwire Updates Its Integrity Software

Tripwire Inc. said it will launch this week an enhanced version of its data and network integrity software that features greater scalability and manageability.

The Portland, Ore.-based security vendor's Tripwire for Server 2.4 will let administrators know if changes have been made to a system's contents by comparing a baseline snapshot of the contents with the most current version of the contents.

According to the company, its new Tripwire Manager 2.4 will let users monitor and manage the integrity of data on as many as 2,500 remote servers and across multiple operating environments. Using the software, security administrators will be be able to quickly find out if a system has been broken into or if the data and files on it have been accessed, deleted or modified. Tripwire Manager 2.4 is priced at $6,000, while Tripwire for Server 2.4 will sell for $595.

Caldera Launches Volution Linux App

Orem, Utah-based Caldera Systems Inc. has released its Volution Linux network management software, which is aimed at making it easier to remotely install and maintain Linux systems across networks using a browser interface. Volution, priced at $2,995 for as many as 10 nodes, will let network administrators use system policies and profiles to reduce costs and improve reliability by monitoring hardware and software inventory, configurations and other details, according to Caldera.

Sun Showcases Vendor Compatibility

Sun Microsystems Inc. last week announced that nine of the 25 technology vendors that license Java 2 Enterprise Edition (J2EE) have passed compatibility testing requirements. Application server vendors such as San Jose-based BEA Systems Inc. and Scotts Valley, Calif.-based Inprise Corp. showcased J2EE-compatible application servers at the press event, but IBM, a major Java-based application server vendor, was noticeably absent.

Windows in the Heart Of the Data Center

But does Datacenter's features checklist match up with what IT managers need?

DATACENTER Server wants to be your enterprise operating system — or at least Microsoft Corp. wants it to be.

With features like 32-processor symmetric multiprocessing support, load balancing and clustering capabilities, the newest version of Windows looks good on paper. But it takes more than good specs to gain entry to the data center.

Computerworld's Robert L. Mitchell recently spoke with **Peter Conway**, director of Windows enterprise server marketing at Microsoft. They discussed how Datacenter stacks up against the competition and how it proposes to meet the demands of data center managers.

Q: In the data center, IT managers say they're concerned with maintaining stable applications over a long period of time. Traditionally, Microsoft has forced people to reevaluate their applications and system hardware every time it comes out with a new operating system revision. Will this happen with Datacenter Server?

A: No. We will continue to encourage our customers to move forward and upgrade. We of course want to be the most competitive platform, but customers have requirements to stay on versions for extended periods of time, and we've made allowances for that.

For example, our OEM partners have an extended window of support . . . for the base platform. They have a minimum five-year support requirement. For those relationships that [go] beyond that five-year window, we will work against the business needs of [those] customers.

Q: Microsoft says it has made special efforts to ensure that Datacenter Server is reliable, yet at least some IT managers may be hesitant to bring Windows into the data center, citing a legacy of reliability issues surrounding Windows. What is Microsoft doing to change that perception?

A: We are delivering a combination of product services, support and partners to execute on the promise of reliability. Your question actually belies our problem in that Windows is prevalent in the industry. So, as a result, even if we have 100 customers running over [99.99%] of business availability, we still get hurt by the one customer that's not running at that level.

Q: Is there a business case for migrating applications to Datacenter Server from midrange systems from companies like Sun Microsystems and IBM?

A: These days, with the integration of the legacy environment with new classes of Web-based applications, there is a massive amount of innovation going on. Many customers in a proprietary environment lose flexibility over time in that they're tied to a particular [hardware] supplier. Then they get involved in a forklift remove-and-replace of the hardware, and they've got to port the application to another environment.

Datacenter offers high degrees of reliability and scalability and [the] whole choice and flexibility changes. The scalability is of great interest from a features standpoint, because [customers] can run much larger database applications with some guaranteed business-level commitments from the OEMs to the customers.

Q: But migrating from, say, Solaris to Datacenter would require a forklift upgrade and a port of the applications as well, wouldn't it?

A: Not necessarily. We have an interoperability framework. We are serious about protecting our customers' existing investments and have a variety of products which offer interoperability and migration of applications between Unix and the Datacenter environments at the network, application, data and management levels.

For example, Microsoft Services for Unix provides a set of interoperability components that make it easy to integrate Windows 2000 operating systems into existing Unix-based environments. Microsoft Interix provides a robust environment that allows organizations to run Unix-based applications and scripts on Windows 2000 directly.

MICROSOFT'S CONWAY: "We think we're the best application platform out there."

Q: Datacenter can support symmetrical multiprocessing with as many as 32 processors. Some Unix systems already support 64 processors or more. Do you see this as a competitive disadvantage for Microsoft?

A: Not at all. It's not how many processors you support but how well you support your customer's complete requirements. . . . I'd rather have 32 fast industry-standard processors rather than 64 proprietary slow ones. I think I have the competitive advantage. Feedback from customers so far as been very positive.

Q: In the data center, administrators may use operating system partitioning to run multiple applications on the same machine. Some systems allow dynamic reconfiguration of processor and memory resources between those partitions without rebooting. Does Datacenter server support this?

A: Datacenter Server includes the Process Control tool, a new job object management tool that allows the administrator to dynamically control the allocation of system processors and memory to specific processes and process groups in each operating system image, without rebooting the operating system.

Our partners who manufacture and distribute the server hardware platforms have differing degrees of hardware partitioning, which allows multiple instances of the Windows 2000 Datacenter Server to run on a single instance of the server platform.

Q: Traditionally, the the most mission-critical, high-end applications in the data center haven't run on Microsoft products. And in some cases, Microsoft has been locked out of the midrange business in the data center as well because companies don't want the hassle of integrating and supporting an additional operating system. How can Datacenter Server accommodate that?

A: We've invested significantly in interoperability products and technology at multiple levels.

At the lowest level, we chose TCP/IP as the base connectivity. We support [Microsoft Message Queuing], the [IBM] MQSeries protocols, NFS protocols, NetWare file and print protocols. We support SNA Interconnect and hosting up through LU6.2 terminal sessions.

We think we're the best application platform out there. You can build it faster on our platform than you can on an alternative architecture.

Q: What changes will Whistler, the pending new version of Datacenter, bring to Datacenter Server this year?

A: There will be some modest additions in terms of features and capabilities, but the data center is a place where continuity is almost more important than lots of new features all the time. So I wouldn't want to set an expectation that it's a major server release with lots of new features. ▮

Security Manager Gets Into Spirit of the Law

Laws regulating user data and government surveillance may be clear, but how to comply isn't

HAVING BEEN so uncomplimentary about lawyers a few weeks back, I've decided that it's time I knew more about the law — at least the law as it affects our IT department. So I've been doing a bit of research into the Byzantine mess of rules and regulations that surrounds our everyday work.

It's hard stuff. My respect for lawyers is growing, if they can put up with a career full of documents of this complexity. Mind you, they probably say the same about IT.

Security Manager's Journal

The Law in Two Acts

Apart from the issues of inappropriate e-mails and monitoring that I discussed last week, there are two legal worries at the back of my mind at the moment: the Regulation of Investigatory Powers Act (RIPA) and the Data Protection Act (DPA).

These laws are specific to the U.K., but security managers around the world face a patchwork of similar laws. For example, the RIPA debate is broadly similar to the Carnivore debate that's been going on in the U.S. Carnivore is the FBI's (apparently successful) attempt to enforce monitoring of e-mail traffic by installing "black box" devices at Internet service providers. RIPA takes a similar approach in the U.K. but goes quite a bit further.

At heart, RIPA is the British government's attempt to extend its powers of surveillance to cover the Internet. The previous law, the Interception of Communications Act, became law in 1985, when few foresaw the rise of mass e-mail and the Internet.

It gives the police and public authorities broad powers to conduct surveillance online that are similar to those they have off-line, which is reasonably understandable. However, as much as I dislike the idea of someone potentially reading my e-mails, I recognize that surveillance is a necessary tool in law enforcement — as long as the power to conduct surveillance is controlled and subject to appropriate checks and restrictions.

However, RIPA goes further than that. If encrypted data is being sent over your systems, the act gives the police the ability to demand access to the encryption key. Obviously, they've got to prove that you've got the key, right? Wrong. It is apparently enough for them to show that you once had it. If the appropriate authorities can show that you used to have the key, it's up to you to prove it's no longer in your possession.

Ethical issues aside, I've got to work out how my company would comply with this in practice. We use a variety of encryption technologies in a variety of places for a variety of reasons, and while I think it's very unlikely that we'll ever be given a disclosure notice under RIPA, we've got to be ready to comply with one if it ever does turn up. The alternative appears to be a potential jail term of up to two years.

Spirit of the Law

As far as I can work out, we have two alternatives. We can comply with either the spirit of the law or the letter of the law.

If we comply with the spirit of the law, we need a managed framework to record copies of any encryption keys we use — wherever and however we use them. We've got to keep these records so that we can supply a key if asked — otherwise, it's easy to show that we used to have a copy of the key because we encrypted some data with it. I have a feeling that if the police ever do show up at the door with a disclosure notice demanding access to some encryption keys, they're unlikely to be satisfied with me saying, "We're not quite sure what we've done with that key. Now, where did I see it last?"

If we do set up a database of encryption keys, then we've created a big risk. We'd better protect that database very well, because if anyone can get access to it, they have the keys to our security kingdom — they could decrypt anything we've ever encrypted.

What we need is a proper public-key infrastructure (PKI) — a hierarchy of keys — managed, controlled and revoked by well-established and solidly enforced procedures. Unfortunately, PKI implementations aren't an easy task. Although companies like Dublin-based Baltimore Technologies PLC make some extremely good PKI products, implementing PKI is something you need to approach carefully and with a great deal of planning. It's not the sort of project I really want to get involved with unless there are some very clear, big benefits coming out of it.

Letter of the Law

So what if we comply with the letter of the law? RIPA says we can't be forced to give up a key if we can prove that we no longer have it, so why not set up a procedure mandating that we destroy encryption keys as soon as we're finished with them? That way, we should be exempt from having to comply with disclosure notices, as we could just point to our key deletion procedure and say we no longer have the key.

That's certainly not very helpful for the police, but it seems much easier than trying to implement a PKI system just so we can give our keys away. I have a feeling, however, that it is not quite as simple as I've made it sound, although I haven't yet worked out why. I'll have to keep digging a bit deeper into this one. Anyone out there know more about it than this?

Data Protection

The other piece of legislation that concerns me at the moment is the DPA. This one is a bit of an odd fish — it's a piece of IT legislation that seems pretty sane and doesn't seem to have annoyed anyone. Everyone who comes across it seems to think it's a good thing — protecting the privacy of the individual without going so far as to make it impossible to comply with the rule.

The DPA puts measures into place to ensure that if you hold data about an individual, then you have to do so with their consent, and it must be accurate, held securely and used only for the correct purposes. It's been brought into force over the past few years, with its powers steadily increasing every year, although I've never heard of any companies getting prosecuted for failing to comply with it.

The U.K. data protection commissioner has just put out a code of practice setting out how we should manage employee data. It's all very sensible stuff, but like all such regulatory documents, it's written in very precise language — 77 pages of very precise language, in fact — and I have to try to work out what we actually have to do to comply with it.

Nevertheless, we have managed to comply with one part of the code of practice very quickly. Apparently, we have to make sure to "provide a means by which managers can effectively expunge e-mails they receive or send from the system and make them responsible for doing so." Simple —they've got the delete key, haven't they? ◗

THISWEEK'SGLOSSARY

Carnivore: An e-mail surveillance system the FBI created and has proposed attaching to Internet service provider networks to monitor suspicious e-mail and Internet traffic. The tool is a version of a commercial Windows 2000 application that has been customized to intercept and view only the e-mail, Web browsing activity or other Internet traffic of a person named in a court order. But Carnivore must scan all the packets moving over a network to find those it wants to examine, which has alarmed privacy activists.

SECURITYBOOKSHELF

Cryptonomicon, by Neal Stephenson (Avon Press, 1999). A sprawling, intellectual, gripping thriller, with its roots firmly set in the insanities that surrounded the use of cryptography in World War II. Can you explain how tattooing a dead butcher, dressing him in a wet suit and dropping him into the Mediterranean helped the war effort? The book spans 50 years, four continents and a surprisingly large amount of computer security. Riveting stuff.

LINKS:

www.baltimore.com: Baltimore Technologies PLC's Web site includes information on security tools ranging from the UniCERT certificate manager to MIMEsweeper scanning software.

■ This journal is written by a real security manager, whose name and employer have been disguised for obvious reasons. It's posted weekly at *www.computerworld.com* to help you and our security manager – let's call him Jude Thaddeus – better solve security problems. Contact Jude at jude.t@lycos.com or click on *Computerworld.com*'s Security Watch community forum to participate in discussion topics.

Digital Delights Dominate CES

Our resident gadget guy is in paradise this week, with about a zillion high-tech toys to ponder. By Russell Kay

THE International Consumer Electronics Show (CES) in Las Vegas brings home the exciting reality of "convergence," the big buzzword that refers to the coming together of computing, communications, the Internet, broadcasting and entertainment.

During my last visit to Las Vegas, for the Comdex/Fall show [Technology, Nov. 20], I was struck by the changing mix of exhibitors, with an influx of new companies and technologies, and the absence of some notable computer industry stalwarts. I heard a number of people comment that Comdex was feeling more like the CES. Being at the CES for the first time, I can report that this show is a whole lot more fun and more interesting than Comdex has been in years — or, possibly, ever.

Some of these products and technologies are powerful and far-reaching, while others are just weird and wacky.

I didn't think that anyone could or would try to create yet another format of removable storage to compete with the current bewildering array of memory devices: compact flash, smart media, multimedia card (also the virtually indistinguishable secure digital card), Imation Corp.'s SuperDisk, Iomega Corp.'s Zip and Clik (renamed PocketZip), Ei Corp.'s Q-Drive and IBM's Microdrive.

But one of the first things I saw was a brand-new optical disk format that's about the size of a quarter — smaller than the 40MB PocketZip — but holds 250MB or 500MB. Called DataPlay, it's from Imation in Oakdale, Minn. (*www.imation.com*), which was displaying prototypes of drives, although real products won't appear until at least September. The disks will cost about $10 each. I hope Imation has better luck with this than it did with its 120MB SuperDisk, whose drive would also read and write to standard 1.44MB floppies. That was a great idea, but it never went far in the marketplace. DataPlay was awarded the CES Best of Show award for a Lifestyle product.

I saw several new readers for the flash memory cards used by digital cameras, personal digital assistants (PDA) and music players. The neatest of the bunch was Zio from Microtech International Inc. (*www.microtechint.com*) in North Brandford, Conn.

Most of these flash readers are significantly bigger than the media they read, with a Universal Serial Bus (USB) cable coming out the back. The Zio reduces the size of the reader to the bare minimum needed to contain the connector, and it eliminates the cable entirely — the whole reader just plugs into the USB port. It's a clever idea, though it won't work too well on laptops whose USB ports are oriented vertically. Still, most newer machines opt for the horizontal format.

SHOWN HERE slightly larger than life-size, the Zio SmartMedia reader is a model of packaging efficiency.

Neat Stuff From the Fringes

As usual, I found the greatest number of interesting and innovative prodocts on the perimeter of the show floor — those booths near or facing the outside walls, where traffic is lower, booths are smaller and rents are cheaper.

Controlled power: Zensys USA Inc., a Danish-American company in San Francisco, (*www.zen-sys.com*), was showing a wireless system for controlling home appliances and lights. It's a far cry from the old powerline X-10 systems and looks quite promising. A sensor plugs into the wall, and you plug a lamp or appliance into the sensor. The programmable remote-control unit is horizontal in layout, with an LCD screen. Unfortunately, Zensys doesn't currently have a product designed for the type of plugs we use in the U.S., though it's looking for partners. I hope the company succeeds; I'd like to get a few of these units for my home.

Just in case: AccuCase LLC (*www.accucase.com*) in Temecula, Calif., was showing an extensive line of carrying cases for PDAs, cameras, CD players, binoculars, sunglasses, cell phones, Global Positioning System receivers, knives and more. They look like the sort of black "ballistic" nylon cases you see everywhere, but they aren't nearly as soft as they look.

Instead, the nylon is bonded to a firm closed-cell foam, with the result being very good protection. The only downside is that if your camera or cell phone doesn't quite fit, there's no forcing it. Still, these are well-made cases and, if they fit your gear, highly recommended. Retail prices run from $16 to $32.

Now you really see it: An odd-looking device shown by Taiwan-based Nikko-Energy Technology Corp. (*www.ni.energy.com*) turned out to be a self-contained magnifying camera, the Micro-Eye MS-228. Just attach it to a TV monitor and set it on top of whatever you want to inspect. It has two magnifications — 40X and 140X — and it's very sharp. No U.S. distribution or pricing is currently available.

Dick Tracy, your wristwatch is ready: Timepieces are an interesting part of the CES, and their functionality gets ever greater. Middlebury, Conn.-based Timex Corp. was showing its Internet Messenger watch, developed in conjunction with Motorola Inc. in Schaumburg, Ill., and SkyTel Communications Inc. in Jackson, Miss. The watch is a full-fledged pager, plus you can send e-mail messages or Web content to it. It's significantly smaller than its predecessor, the Beepwear pager watch. There's a vibrating alert signal, and the watch automatically sets the correct time from SkyTel.

THE MICROCAMERA shows Washington's eye on a $1 bill.

THE MUSLIM CLOCK issues a call to prayer five times daily.

Tokyo-based Casio Computer Co. in Tokyo was showing a wristwatch with a built-in digital camera (though it takes — and displays — only monochrome pictures 120 by 120 pixels in size), and PC-Unite, which can download your schedule, contacts and to-do list from Microsoft Outlook.

The two clocks I liked best are radically different. One of them is a playful wall clock whose pendulum is a glowing plastic Slinky. The other is a talking clock that looks like an Islamic mosque. It chants the azan, or Muslim call to prayer, for three and a half minutes, five times each day. It also announces the hours and has a 105-year calendar.

See your CDs: I keep most of my software library of CD-ROM disks in two binderlike cases made by Case Logic Inc. in Longmont, Colo., each capable of holding 256 disks in transparent plastic sleeves, eight per leaf. For 2001, Case Logic has redesigned these cases to lie flatter, making retrieval easier, and it has upped the capacity to 264. The company also has smaller cases.

Faster links: With the increasing acceptance of the IEEE 1394 standard for a fast serial connector (better known as FireWire), how do you retrofit your desktop for this new connection? Belkin Components in Compton, Calif., has an interesting answer to that: a combo FireWire/USB card that fits into any desktop Peripheral Component Interconnect slot. ▶

Is It Real, or Is It LifeFX?

THE YOUNG WOMAN is real. LifeFX collects data describing the structure of her face and creates a digital skeleton. Bone, muscle and skin are later mapped onto the skeleton.

A 3-D digital human could answer phones and staff your help desk – and it would never lose its temper or forget a name.

By Sami Lais

A SMALL COMPANY in suburban Boston has achieved a goal that has so far eluded even the mightiest of Hollywood special effects machines — it has made an image of an old woman smile convincingly. Digitally.

Made not of flesh and blood but instead of bits and bytes, she is a digital creation nf LifeFX Inc. in Newton, Mass. What is most remarkable about her is that she moves and speaks in a lifelike way, even when viewed so close you can count her pores.

The goal of creating a lifelike human animation has been elusive because we move so many muscles as we speak or even listen. Brows knit, eyes roll, lips curl up in a smile then purse, cheeks puff out. The skin is smooth or wrinkled, it has large or small pores, it draws taut or crinkles at eye corners. And consciously or not, we notice every little detail.

LifeFX's old woman isn't perfect — her eyebrows aren't symmetrical, her smile is a bit crooked — and that may be the secret of the company's success.

"It is its imperfections that makes something look real," says Louis Latham, an analyst at Gartner Group Inc. in Stamford, Conn.

Video game developers first made a perfect computer-generated spaceship, but "its perfectly smooth, shiny surface looked cheap and unreal," Latham says. "They found that by adding some dings and scuffs, and making it less perfect, they made it look more real," he says.

Initially, LifeFX had its eye on the entertainment field, says Lucie Salhany, co-president and CEO of LifeFX. "But as the Internet grew, we saw a growing need for a better human-to-machine interface."

The company also has strong roots in medical research. Early models were built to increase understanding of human physiology and for use in telemedicine and distance learning.

LifeFX builds the human head from the inside out, first describing eyeballs and tongue and how they move. Then the teeth and jaws. It builds a skull and attaches each muscle, then covers its flayed human with skin. Each bit of flesh and bone, each ligament and tendon and how it moves is digitally described.

As the digital human blinks, the application draws on this 3-D database to describe how underlying muscles cause the eyelid to fold back into itself, drawing the skin with it.

By altering the database to reflect the changes that occur with age — a decline in bone and muscle mass, joint flexibility, and muscle and skin elasticity — and how those alterations in characteristics affect the way the body moves, the application can digitally age a young woman. By adding a text-to-speech engine, LifeFX's digital creatures speak in a lifelike way.

LifeFX's first commercially available product, Facemail, was released last month and is available free at the company's Web site. Facemail offers users a choice of five different 3-D digital stand-ins to deliver their e-mail messages.

After downloading the free Facemail player, users select a stand-in, who will deliver their talking e-mail. Users type their message, a text-to-speech engine converts it to audio and syncs it with facial movements of the stand-in, and the audio e-mail is sent. To see and hear the e-mail, recipients also must download the Facemail player.

By adding any of a half-dozen "emoticons," users can cause their stand-ins to make an appropriate facial expression at a particular spot in the message. For example, instructing the image to wink as it says, "You want me to work the weekend? Oh, sure, sign me up for that," would presumably clear up any confusion over the likelihood that you will show up for work Saturday morning.

In simplifying the software to run over low-bandwidth connections, some verisimilitude is sacrificed. If the stand-ins are less convincing, the audio and video are at least in sync.

Later this year, Facemail will let users speak into a microphone and have their stand-in deliver the message.

By the end of next year, users will be able to send LifeFX a digital or analog photo of themselves and get a stand-in of themselves to use in e-mail, chat rooms and instant messaging. ▶

Novelty or New Business Tool?

The novelty of having a digital human read your e-mail aloud will attract Facemail's first users, but its effectiveness as a business tool will retain users, say spokesmen for LifeFX.

The company last month released its first commercial product, Facemail, which lets users select one of five stand-ins, as LifeFX calls its digital avatars, to deliver their e-mail.

LifeFX is negotiating with two Fortune 100 companies to license the 3-D talking heads for use on their Web sites, says Lucie Salhany, CEO and co-president of LifeFX.

"Shopping-cart abandonment is a big problem," she says. "Supposing there's someone to help you through the process, or even to say, 'Are you sure you don't want to buy this?' "

Perhaps, says Jackie Fenn, an analyst at Gartner Group. "But if you're at work and you're busily buying a sweater online, you may not want someone on your screen announcing it," Fenn says.

And although Facemail's inflection and visual cues may cut down on misunderstandings engendered by e-mail, as LifeFX claims, "it may prove disruptive in an office full of cubicles," according to Fenn.

But e-mail is only the beginning, says Mark Sagar, vice president of research and development at LifeFX. By linking the visual technology to artificial intelligence and an English discourse engine, a lifelike digital human can interact with users.

"Think of a HAL-like creature," Sagar says, referring to the computer in Stanley Kubrick's film *2001: A Space Odyssey*.

"It's a natural for telemarketing, call centers, help desks, any repetitive tasks," Sagar says.

It can also cut costs, adds Salhany. "The average customer service call costs $25 to $33 per incident. Think of the savings if you can automate that," she says.

Much of what its avatars can do can also be done "in text, but it's cold," Salhany says.

"The biggest difference [the technology offers] is in adding sound," Fenn says. But in "online retail, for a help desk, it could work. People react differently when a machine is humanized. Look at speech recognition — people start saying please and thank you, and they know they're talking to a machine."

– Sami Lais

NOT

EXCHANGE 2000 SERVER, the successor to Microsoft Corp.'s Exchange Server 5.5, offers new bells and whistles that take the application well beyond its e-mail roots. It also offers many meat-and-potatoes improvements that administrators have been requesting.

But Exchange 2000 is also not your typical upgrade. This is the first major application from Microsoft that requires Active Directory (AD) — in other words, you can't implement Exchange 2000 until you upgrade all of your Exchange servers to Windows 2000 and create an organizationwide AD structure. This is, in fact, a daunting task that's been slowing down many Windows 2000 Server implementations.

In short, Exchange 2000 Server is a major infrastructure upgrade that will take time to plan and implement correctly.

"What people have to do to move to Exchange 2000 is a lot of work," says Joyce Graff, an analyst at Stamford, Conn.-based Gartner Group Inc. "If you don't have the whole top-to-bottom Microsoft solution, you don't feel all the benefits." But, she adds, "I think this will be one of the drivers for [organizations to migrate to] Windows 2000."

Exchange now includes collaborative features such as instant messaging and the Web Storage System — a universal, fully indexed container for e-mail message folders and Microsoft Office documents that users can access through Windows Explorer, a Web browser or an Outlook client. And a new add-on, Exchange 2000 Conferencing Server, adds application sharing and multicast videoconferencing services.

E-mail improvements include support for Multipurpose Internet Mail Extensions content and Simple Mail Transport Protocol (SMTP) routing, as well as the ability to consolidate routing groups and delegate administrative tasks at a more granular level than Exchange 5.5 supports. Administrators can now chop up those ever-expanding message databases into smaller, more manageable ones. And enhanced clustering support enables both server consolidation and improved fault tolerance.

Reasons to Migrate

One benefit of migrating to Exchange 2000 is server consolidation.

"In our larger locations, where we have 2,000 or more people, we think we'll win from the consolidation. They will have less servers to administer," says Vicki Fredrick, IT director at Aventis Pharmaceuticals Inc. But, she warns, "we're not ever going to sell this purely on administration. We're selling it as an integrated platform."

Bridgewater, N.J.-based Aventis has 50,000 e-mail users on 181 Exchange 5.5 servers in 100 locations worldwide. In the pilot phase of Aventis' migration to Exchange 2000 at its Kansas City, Mo., offices, the company consolidated 4,500 Exchange 5.5 users on nine servers onto just two Exchange 2000 servers.

"You couldn't do this under the previous architecture of Exchange," says Henry Creagh, a consultant at Aventis. "The main reason why most places have so many Exchange servers is because they didn't want their Exchange database that had all the user mail to get too large. [If it did,] they couldn't back it up and restore it to meet their service-level agreements," he adds.

And there was another incentive to keep databases small, says Graff: Exchange 5.5 databases larger than 60MB have experienced reliability problems.

And since Exchange 5.5 only supported one database per server, the number of databases — and thus, of servers — multiplied. Exchange 2000 can host up to 20 message databases on one server. This results in smaller databases with faster backup and restoration times, Creagh says — and fewer servers.

"You're saving [on] floor space in the data center, licensing [and] the number of servers you'll ever have to put a service pack to or hot-fix. It's less to watch, less to pay for," he says.

Graff says she agrees that multiple message databases help administrators get around this problem, but she warns that managing those databases becomes more complex. "That's one of the things that's making people think," she says.

Dan Guttman, manager of messaging technology and operational systems at The MTVi Group Inc., the online arm of New York-based MTV Networks, says the added fault tolerance provided by Exchange 2000's active-active clustering made the transition worthwhile. MTVi consolidated 850 users attached to Exchange 5.5 servers in three sites onto two clustered Exchange 2000 servers.

At MTVi, "there was zero tolerance for lack of mail flow," Guttman says. Active-active clustering allows services to be active on both cluster members, so each can host mailboxes during normal operation. When one server fails, the other automatically takes over the failed server's mailboxes. Guttman says that during testing, when beta versions of Exchange 2000 failed, "users never knew there were problems."

Graff says she sees clustering as a step forward but cautions that it's still not transparent. The fail-over process may take 10 to 30 minutes, and users will have to log back in, she says.

One reason not to proceed right away with an upgrade is because end users will see little benefit, says Graff. "What [Microsoft] has done is work a lot on the plumbing, but they're not the kinds of things that end users will appreciate out of the box," she says.

One thing that's missing, for example, is a new desktop client. "The client/server interaction between Outlook and Exchange does not significantly improve until Office 10," the current name for the successor to the Office 2000 suite, which is due to ship later this year, says Graff. But she says she does see one user benefit: The new Outlook Web Access (OWA) client, which allows users to access their Exchange e-mail through a browser, is a significant improvement for users, and it allows administrators to support more OWA users on fewer dedicated front-end OWA servers.

Finally, the newly minted collaborative features in Exchange 2000 are limited. "The functionality is very light and not well integrated," Graff says. "Microsoft has made strides, but [it's] still about a year and a half behind [Lotus Notes]." And applications that leverage these features have yet to arrive, which means end users will see little benefit today, she adds.

The Infrastructure Challenge

Perhaps the biggest challenge in installing Exchange 2000 is the infrastructure changes that are required. The Windows 2000 AD replaces Exchange 5.5 as a repository for user account attributes and information. So at a minimum, administrators must upgrade all Exchange 5.5 servers to Windows 2000 and install at least one Windows 2000 server on which to create an AD structure.

"Most people are not going to do this over a short period of time," says Graff.

Aventis decided to upgrade its Windows NT do-

Continued on page 64

SCOTT INDERMAUR

TECHNOLOGY

Continued from page 62

main controllers first. "We knew we wanted to move to Exchange 2000, so we knew we had to start planning our Windows 2000 deployment," says Fredrick.

MTVi upgraded its print servers and Exchange servers, but it didn't have to worry about its Unix-based file services, Guttman says.

Aventis began upgrading its Windows NT domain controllers to Windows 2000 and creating an AD for its 50,000 users last February; it finished on May 2. Next, Aventis used Exchange 2000's Active Directory Connector (ADC), a utility that imports the Exchange 5.5 user account attributes and the public folder structure into AD and maintains ongoing "connection agreements" between AD and Exchange 5.5 directories to keep them synchronized.

Fredrick stresses the importance of having a fully populated directory before using ADC. "If you don't have your [AD] accounts there, you don't have anything to populate," she says.

Weighing Your Options

That's true, but you don't have to fully deploy AD and Windows 2000 to install Exchange 2000, claims Ken Ewert, program manager at Microsoft. For Windows NT 4 users for whom no AD account exists, the ADC puts a disabled "placeholder account" into the AD to hold the user's Exchange account information, he says. In this way, the Windows NT/Exchange 5.5 users "have a presence on each location," and that presence "is kept in sync with the ADC," he says.

But, he adds, "you will have duplicate accounts for those . . . users," and when you're ready to migrate those Windows NT user accounts to Windows 2000, you must run a utility to merge the new migrated AD account and the placeholder account.

Both Aventis and MTVi avoided this by upgrading their domain controllers to Windows 2000 and creating and populating a complete AD structure beforehand. Besides, says Creagh, "if you do it the other way, you'll lose the current [Windows user account] passwords. In an enterprise company, that's not acceptable."

At Aventis, getting the new address book clean and stable was a big effort. "We spent that week just checking our directory," Creagh says. One problem was the existence of inactive mailboxes and multiple mailboxes associated with a single user account. When the ADC finds multiple mailboxes for one user account, it takes in the first one and discards the others, he says. "You need to go through and tag the ones that shouldn't be matched up," he says. Creagh suggests that administrators weed out these mailboxes before running the ADC to save time.

About a week after completing the directory, Aventis set up its first Exchange 2000 server.

Both MTVi and Aventis used new server hardware and moved mailboxes over from the existing mail servers. "This is not an in-place upgrade; you migrate," says Gartner's Graff. "You build a parallel system, and you migrate these users from the Exchange 5.5 tower to the Exchange 2000 tower."

Aventis also created a test system that mirrored the production environment before going live. "In years past, we'd have a lab but install everything clean," Creagh says. "Don't generate [test] data; use your production data, and you'll be surprised what you learn from it."

MTVi and Aventis are both still running Exchange 2000 in parallel with Exchange 5.5 servers. In this mixed-mode environment, says Creagh, you're stuck with remote procedure call communication between the new and old routing groups rather than the faster, industry-standard SMTP. And you can't separate routing groups from administrative groups — a critical feature if, like at Aventis, you want to centralize control of routing groups but delegate other administrative functions within a large organization. "We don't want the local administrators messing around with the routing," Creagh says.

"We're not going to realize the full impact of this until we're further down on our migration," Fredrick acknowledges. And in a company the size of Aventis, that takes time. "It will probably [take] the next two years to have [all 50,000 users] migrated," she says.

Both Aventis and MTVi have also set up new Exchange features, such as instant messaging, conferencing and OWA, on separate servers. But Aventis is still focused on getting the basic Exchange functions in place. "If you don't start in a methodical order, you're going to end up with a mess," warns Fredrick, noting that OWA and instant messaging require deploying new desktop client software and browsers.

Aventis and MTVi both say they're impressed with the value of instant messaging. But the inability of Exchange's instant messaging to work with other messaging systems is a problem for business-to-business communications, says Graff.

"This is one of the biggest mistakes Microsoft is making. By stressing the need for homogeneity, they're missing the point," she says. And ironically, while the NT and Exchange directories are now integrated into AD, instant messaging isn't. It uses a different client and directory, Graff says, so user information must be entered and managed separately.

IT managers considering a move to Exchange 2000 should plan carefully and move slowly, current users say. "My advice is to plan out your Active Directory well in advance, create a test environment and put a good deal of thought into it," says MTVi's Guttman.

Fredrick says she agrees: "You have to look at the big picture. This is an architectural change."

Graff suggests waiting. "It's not going to be easy to implement, and end users aren't going to feel the benefits. We've suggested that people hold off until the middle of 2001," when Office 10 and the new Outlook client become available, she says.

But Guttman says he thinks the back-end benefits are compelling. "The simplification of administration for Active Directory is worth it," he says. "It actually decreased administrative costs for us."

Fredrick stresses that it's a big project.

"If you really want to take advantage of all the components, you can't leave anything out," she says. "You can't leave security out. You can't leave the network out. You can't leave the desktop out. You've got to look at it as a complete platform, and that scares a lot of people." ◆

> "
>
> You've got to look at it as a complete platform, and that scares a lot of people.
>
> VICKI FREDRICK, IT DIRECTOR, AVENTIS PHARMACEUTICALS INC.

EXCHANGE SERVER 2000

PROS

- Supports multiple message databases per server
- Active-active clustering improves fault tolerance
- New Outlook Web Access can support more users on fewer front-end servers
- Adds new collaborative features like instant messaging and the Web Storage System
- Can delegate tasks to administrators with more granularity

CONS

- Requires at least a partial upgrade of your organization's infrastructure to Windows 2000
- Requires the creation of an organizationwide Active Directory structure
- Deployment across a large enterprise could take a year or more
- Some features aren't available until all users are moved over
- Third-party programs like backup software may not yet support Exchange 2000
- Most immediate benefits are to administrators; users won't see much difference until the release of Office 10 Outlook later this year

Managin Informat

Even after migrating to single- users say management across infrastructures remains a chall

WHEN UPMC HEALTH System wanted to better manage storage and backups for a diverse array of computer systems across the company, the Pittsburgh-based health care provider decided to consolidate by building storage-area networks (SAN).

The SAN arrays and StorageWorks management software from Compaq Computer Corp. have helped ease management headaches, says Joe Furmanski, UPMC's manager of systems and planning. But in a multivendor-system environment, the new Compaq management tools still can't do it all.

"[StorageWorks] isn't across the line, and it isn't one robust tool," Furmanski says. "We're looking at [other] vendors to provide us true management software so it isn't little point products here and there."

Bringing in enterprise-class — and often single-vendor — storage subsystems helps bring order and manageability to growing storage requirements, IT managers say. But while the management software sold with these systems serves many key functions well, some tools may be lacking, and no tools are yet available that provide truly centralized control across all enterprise storage resources, say users and analysts.

"They're testing it out and finding that a lot of the storage management issues are still to be worked out," says Anne Skamarock, an analyst at Boulder, Colo.-based Enterprise Management Associates Inc.

Mix-and-Match Management

UPMC built its Compaq SANs around legacy computers and storage, including Windows NT file servers, Digital Equipment Corp. VAXs with OpenVMS, Sun Solaris systems, IBM systems running variants of Unix, and OS/390 mainframes. The new system includes StorageWorks Enterprise Storage Arrays and Enterprise Modular Arrays.

The health care company originally introduced StorageWorks management software five or six years ago, when it added SCSI-attached storage devices to OpenVMS and NT systems, says Furmanski, who oversees 55 mixed-vendor Unix servers and several minicomputers and workstations. Jim Vellella, associate director of technical services and Furmanski's counterpart on NT systems, manages 240 Compaq ProLiant servers, most of which still use direct-attached SCSI storage.

The new SANs also play a role in managing backups. Two data centers in Pittsburgh hold 30TB of data between them, and UPMC uses 300 digital linear tape drives to fill nearly 8,000 tapes. The data center staffs (about 20 people in total) spend 40% of their time on storage management issues. "Most of the things we do are 24/7, so there aren't a lot of backup windows," says Furmanski.

"It's getting to be a lot of work for our people to do," Vellella adds.

The company also uses StorageWorks for SAN configuration, monitoring and alerts, and Mountain View, Calif.-based Veritas Software Corp.'s Backup Exec for backing up the NT servers. Vellella also uses network performance monitoring software from San Jose-based NetIQ Corp.

UPMC is looking for a more comprehensive tool that will manage storage across the enterprise as it begins to tie the systems together. The company is investigating software that Vellella says will be more scalable. These products include backup software from Veritas and Mountain View, Calif.-based Legato Systems Inc. and broader products such as Houston-based BMC Software Inc.'s Application-Centric Storage Management modules; Islandia, N.Y.-based Computer Associates International Inc.'s SAN Integrated Technology Initiative framework, which includes its ArcServeIT software; and Austin, Texas-based IBM subsidiary Tivoli Systems Inc.'s Tivoli Storage Manager (TSM).

Planning for Growth

First Union Corp., the nation's sixth-largest bank, took a different approach to solving its storage management problems but faces similar issues. The Charlotte, N.C.-based firm saw its storage needs skyrocket because of increased internal use of data warehousing tools and a move into e-commerce that added nearly 400 servers. First Union now stores 120TB of data in its Charlotte and Jacksonville, Fla., data centers, and a planned custom-built check-imaging system will add to the total later this year.

"It's been at least a [200%] growth, from a storage perspective, every year," says Gary Fox, First Union's vice president of IT.

First Union considered using SANs, which off-load storage systems to dedicated high-speed networks controlled by Fibre Channel switches. It instead went with network-attached storage, putting cross-platform storage devices directly on the company's production network.

Fox maintains approximately 1,000 NT and 1,000 Unix servers attached to 67 storage systems supplied by Hopkinton, Mass.-based EMC Corp. The Control Center software that comes with the EMC hardware is Fox's primary management tool, and he says the amount of time and effort required to support the Unix server storage has

g the
on Store

vendor storage subsystems,
arge-scale enterprise storage
enge. By David Essex

decreased. But management across all enterprise storage systems is still lacking.

"We will use this approach until we find a tool that will globally manage it," says Fox, who is reviewing products from Marlboro, Mass.-based High-Ground Systems Inc., Veritas and Tivoli as alternatives.

Out With the Old

People's Bank in Bridgeport, Conn., migrated its storage to EMC drive arrays and switches and Tivoli's TSM software, retiring legacy storage systems from Milpitas, Calif.-based Storage Dimensions Inc. and Sun Microsystems Inc., as well as mainframe storage from IBM and Blue Bell, Pa.-based Unisys Corp.

"Primarily, we did it for the flexibility — the ability to expand capacity quickly," says Lena Zoghbi, the bank's vice president of enterprise systems management.

Raju Palnitkar, vice president of enterprise server systems, says he saw the move to one homogeneous system as the best choice to get a handle on storage management. "We did not have to have IBM tools and Unisys tools and Sun tools to manage each of the different storage types," he says.

Most of the bank's approximately 500 servers run NT and Solaris, with a few IBM AIX and OS/2 servers and AT&T Corp. Unix-based servers. Each night, Zoghbi backs up 600GB of data on the servers and a mainframe to EMC Symmetrix 3430, 3830 and 5500 RAID arrays.

Six EMC Connectrix switches provide the interoperability among the bank's servers, according to Palnitkar. In addition to the TSM software's backup and monitoring features, EMC's PowerPath load-balancing/fail-over software and Symmetrix Manager monitoring software serve as the bank's primary management tools. Several people spend the equivalent of two full-time jobs managing storage.

"I think the combination of these [storage management tools] is sufficient for what we need," Palnitkar says. "But the EMC tools don't give us all of the flexibility we need. We still need to get EMC involved in some of the changes."

Consolidate and Conquer

A desire to consolidate disparate storage and server systems — some inherited in acquisitions — while implementing disaster recovery plans was the main reason behind a storage initiative at Louisville, Ky.-based Vencor Inc., a provider of long-term health care services.

"We've been in the process of trying to standardize," says Charles Wardrip, Vencor's director of IS operations and telecommunications. The company built what Wardrip describes as a mainframelike storage model.

"Everything that used to be distributed was now brought into the data center," including 28TB of data on 700 NT and Unix servers, Wardrip says. "We were concerned about interoperability. We felt like if we went with a single vendor, then they had some responsibility for what they sold. Our goal was really to have a single vendor who has some skin in the game."

Seven people manage Vencor's SAN, which is built around EMC Symmetrix disk arrays and Connectrix Fibre Channel switches. The new system replaces much of the legacy equipment, including older Fibre Channel switches, Compaq SCSI-attached storage systems and IBM Serial Storage Architecture systems.

Tivoli's TSM is the primary management tool — the cornerstone of the new backup and recovery system. But Wardrip says he sees a need for broader control.

"Utilization and long-range capacity planning are big issues for us," Wardrip says, adding that he's considering software from both Tivoli and Veritas. He says he would also like to have better control of the SAN's Fibre Channel network itself, rather than rely on EMC guidelines, but he hasn't found software that will do this effectively.

Generation Gap

Manageability may eventually improve if the next generation of servers and storage devices are better able to work together.

That's the goal of ongoing industry standardization efforts. For example, the Mountain View, Calif.-based Storage Networking Industry Association (SNIA) has a working committee that's hammering out a Common Information Model that will let storage devices report themselves to software in a standardized way. Meanwhile, storage system vendors continue to push their own de facto standards.

On a positive note, hardware compatibility took a big leap last year with the arrival of SAN switch interoperability, says Dave Anderson, director of strategic management at Seagate Technology Inc. in Shakopee, Minn. Anderson chairs an SNIA working group focused on object-based storage devices, an emerging technology that could enable storage to manage itself.

Users primarily want to bring some sanity to their increasingly complex storage systems, says John Webster, an analyst at Nashua, N.H.-based Illuminata Inc. "Unfortunately, I don't think they're going to get it right now," he says. "There are so many approaches in the market." ▶

Essex is a freelance writer in Antrim, N.H.

Compilers, Interpreters and Bytecode

DEFINITION

Compilers are programs that translate raw source code, which is usually written in a higher-level programming language, into a machine language program that's directly understandable for computers. The translation, called an executable program, can be installed and run on a target computer without additional translation software. **Interpreters** perform a similar function, but they do it one line at a time at runtime. **Bytecode** is an intermediate approach, whereby a program is translated into an intermediate binary form that's interpreted by a "virtual machine" at runtime.

BY ALAN JOCH

COMPILERS are a bit like Florida election officials: They're suddenly in the spotlight after years of relative anonymity.

The reason for the attention is the arrival of fast and complex 64-bit microprocessors, typified by Intel Corp.'s Itanium line. All of the sophisticated architectural innovations like parallelization and branch prediction, as well as the promises of significant performance gains, will mean little unless programmers can actually use these enhanced capabilities.

Writing code specifically for efficient parallel processing makes the difficult task of modern programming even more challenging. As a result, responsibility for achieving many of the performance claims of future 64-bit processors will fall on the shoulders of their next-generation compilers.

These performance-savvy compilers are already arriving from the research and development labs of Hewlett-Packard Co., Intel, MetaWare Inc., Microsoft Corp. and others. Last February, Mountain View, Calif.-based Silicon Graphics Inc. announced that its optimizing compilers delivered 30% to 100% better performance than existing compilers when teamed with Itanium processors running Linux.

Like their ancestors, optimizing compilers turn high-level programs into machine code. However, their extra contribution is making sure the translations handle memory — particularly processor-level caches and parallelization — as effectively as possible.

For example, Itanium processors are designed to simultaneously handle as many as six instructions per clock cycle. But to achieve this, a compiler must keep a steady stream of data flowing through the instruction pipeline.

One technique is to corral frequently used instructions into tight groups that the CPU can break into instruction strings and process simultaneously. Optimizing compilers also maximize cycle times through branch prediction, where the compiler attempts to predict the results of GOTO instructions, thus saving the CPU from having to locate outcomes dispersed throughout a program. Speculation, a related technique, has the optimizing compiler load instructions early, in an attempt to improve the CPU's performance. Some research labs, including the University of Illinois at Urbana-Champaign, have developed working examples of next-generation compilers.

Other Options

Interpreters also translate high-level programming code into machine language, but they do it line by line as the application runs. The computer that's running the high-level code must also run the interpreter in order to understand the program. Interpreters are valuable for testing newly written or modified code or teaching programming. Basic started as an interpreted teaching language.

Software that's compiled ahead of time runs faster than interpreted programs. Thus, compiled programs are preferred for large, enterprisewide applications, but they aren't as good for Internet Age applets destined to run on an unknown target machine.

The Java platform uses a third alternative, bytecode. With bytecode, a high-level program is translated into an intermediate form that can run on various hardware platforms. Java bytecode is morphed into machine-specific code through a real-time interpreter called the Java Virtual Machine (JVM). This JVM builds a dedicated memory space that houses applets and keeps them separate from the host system's storage.

Just-in-time (JIT) compilers promise to improve the performance of Java applications. Rather than letting the JVM run bytecode, a JIT compiler translates code into the host machine's native language. Thus, applications gain the performance enhancement of compiled code while maintaining Java's portability.

HP is taking a similar tack with its TurboChai compiler, a Java compiler for embedded applications. TurboChai aims to boost performance by translating the most frequently used code within a given embedded application. Through selective compiling, HP plans to control memory usage while achieving speeds comparable to those of JIT compilers. The TurboChai compiler takes Java bytecode as input, generates ANSI C source code and then uses any C compiler to generate optimized native code.

Last summer, Microsoft announced C#, an object-oriented programming language that embraces XML. Microsoft portrays the new language as a logical evolution of C and C++ for Web applications. Key modules will be the Common Language Runtime for C# and a special compiler that will turn traditional Cobol, Perl, Fortran or other code into an intermediate language that would then operate on Microsoft's new .Net platform.

End users are unlikely to become compiler junkies. Nevertheless, it may take a new generation of compilers to deliver the performance gains necessary to convince professionals that they need to embrace 64-bit hardware architectures.

Joch is a freelance writer in Francestown, N.H.

Developments in Development Tools

DEVELOPMENT TOOLS	WHAT'S NEW	GOALS
Optimizing compilers	Achieve high CPU processing performance via parallelization, branch prediction, speculation	Help 64-bit processors realize their potential
Just-in-time compilers	Compile real-time code on client machines	Improve performance of interpreted languages like Java
Selective compilers	Compile only the most frequently used code within embedded applications	Improve performance without draining precious memory resources

■ *Are there technologies or issues you would like to learn about in QuickStudy? Please send your ideas to quickstudy@computerworld.com.*

Don't miss the industry's most respected forum on Information Technology

DIRECTIONS 2001

The New Foundation:
Services and Technology for Business

The year 2000 brought in more than a new millennium - it also marked a major migration from the old economy to a new wired, mobile economy. And, for many, the migration wasn't pretty. One only needs to look at the stock market, dot-coms, and many brick-and-mortars trying to build online operations to see the tumultuous impact of this market shift. IDC has the research and expertise to help companies face this challenge. For more than 35 years, we've been helping technology executives build on their successes through our annual Directions briefing sessions. Directions 2001 is a must-attend for anyone seeking success in the latest evolution of the new economy.

To register and for more information, call:
1-800-605-5849
or visit
www.idc.com/events/dir01/

March 7, 2001
San Francisco, CA
The Moscone Convention Center

March 13, 2001
Boston, MA
Hynes Convention Center

Co-sponsored by:

COMPUTERWORLD The Newspaper for IT Leaders
PC WORLD
IDC *Analyze the Future*

AGENDA

9-12:30 MORNING SESSION

- **Introduction and Welcome,** *Vicki J. Brown, Chief Operating Officer*
- **Business Takes the Leap: Old and New Worlds Collide,** *John Gantz, Chief Research Officer*
- **ASPs, ISPs, XSPs ...Where Will It All Lead?**
  Clare Gillan, Group Vice President, New Business Initiatives
- **Hardware: Get Ready for the Appliance-Centric Era**
  Crawford Del Prete, Senior Vice President, Hardware Research
- **Unwiring the Wired Market**
  Pim Bilderbeek, Vice President, eBusiness and Networking Research, IDC EMEA

Session A 1:45 - 2:25	Session B 2:35 - 3:15	Session C 3:25 - 4:05
Globalization Opportunity Assessment Barry Parr	Building the eBusiness Web: Getting Down to Business in B2B Rick Villars	Regional eBusiness Perspectives Philippe de Marcillac
The New Edge of Mobile Information Randy Giusto	The Connected Home of Tomorrow Danielle Levitas	The Networking Edge in Small Business Ray Boggs
Beyond Transactions: Content, Analytics, and Collaboration Drive eBusiness Henry Morris	The Elusive but Essential 3As Security Issue Chris Christiansen	Value Chain Integration: The Hallmark of Serious Business Steve Hendrick
IP Communications and New World Voice Mark Winther	Next-Generation Broadband Networks Lee Doyle	Data Centers for eBusiness Lucinda Borovick
Assembling the Components—Services for Building and Managing the eSupply Chain Christopher Hoffman	Application Infrastructure Providers—The Engine of eBusiness David Tapper	Getting to "M"—Services for Helping Companies Go Mobile Meredith Whalen
The Bio-Century: Positioning to Win in This New Era Debra Goldfarb	Server Infrastructure for the eBusiness Economy Vernon Turner	Architecting Information Access for Tomorrow's Customer John McArthur

4:15-5:30 CLOSING SESSION

- **San Francisco Only: The New New Economy or the Real Beginning of the E-Age**
  John Seely Brown, Chief Scientist of Xerox Corporation - Director, Xerox Palo Alto Research Center
- **Boston Only: The [illegible] of Information Technologies in a Knowledge-Based Economy**
  [illegible] Economics

Compute Farms Bring Power to the PC

Blackstone Technology Group harnesses PC power for compute-intensive apps

BY DAVID ESSEX

CHRISTA Schidzik's job as manager of systems administration at NEC Electronics Inc.'s chip design facility in Dusseldorf, Germany, is often more a resource management challenge than a technology challenge. Engineers who design CPUs and application-specific integrated circuits must lay out their complex designs and simulate the chips' program code — compute-intensive tasks that create fluctuating demands for mainframe-class power.

"Before, we had big servers for every department, and normally, it was never enough," Schidzik recalls. Then she heard about compute farms: servers pooled to create a single computing resource optimized for CPU and memory-intensive applications.

After trying to configure a farm on its own, NEC called Blackstone Technology Group (BTG) in Worcester, Mass. Using BTG's ComputeFarm Advantage consulting service and software, Schidzik says, NEC had 50 users accessing a farm within a week.

Server utilization has since doubled to about 25%, she says. The need for new hardware has been mitigated, and spikes in demand are more easily accommodated. "I'm quite sure we couldn't have survived without the farm," Schidzik concludes.

Betting the Farm

BTG started in 1996 as a value-added reseller of electronic design automation (EDA) tools before relaunching with its compute-farm services in 1999.

"We started to see a bigger and bigger opportunity" in offering compute farms to customers, says Kanti Purohit, BTG's chief operating officer. Since then, the company has signed on biotech heavyweights such as Biogen Inc. in Cambridge, Mass., and Celera Genomics Group in Rockville, Md.

BTG's offerings range from construction of compute farms from the ground up to reconfiguration and management. It also offers software that lets companies function as application service providers to sell compute power over intranets or the Internet.

Biogen threw the switch on its farm, built on 200 Intel-based Linux servers and a Sun Microsystems Inc. "portal" node, last month. It will use the new capacity mostly for data analysis to look for pharmaceutical "targets" in the human genome.

Biogen selected ComputeFarm Advantage over more generic offerings from Compaq Computer Corp. and Mountain View, Calif.-based Silicon Graphics Inc., according to Rainer Fuchs, director of research informatics.

CEO Ron Ranauro says BTG wants to expand into other compute-intensive markets, starting with financial risk modeling, digital content creation, oil and gas exploration and mechanical design automation. But BTG's industry-specific knowledge is a major selling point, so the company might lose focus, warns Diane Myers, an analyst at San Jose-based Stratecast Partners.

BTG competes with mainframe and supercomputer vendors, as well as other compute-farm vendors such as Compaq and Sun, with whom it also has partnerships. These and other firms, such as Microsoft Corp., also offer related clustering technology for aggregating computing resources. One — Linux Networx Inc. in Sandy, Utah — assembles Linux clusters for some of the same verticals as BTG, including EDA, bioinformatics and oil and gas.

Purohit says the early going was tough because few people understood the compute-farm concept. Making money on load sharing — essentially a commodity — was another problem, as was "coming up with a business model that is going to be sustainable in an environment where the major platform vendors are going to be a player," Ranauro says.

BTG's expertise and technology have won the respect of customers and partners. "They are a powerful emerging player in a space that I don't think has gotten a lot of attention and likely will going forward," says Jilani Zeribi, an analyst at Current Analysis Inc. in Sterling, Va. "Blackstone's competitors, in my opinion, are people doing it on their own. Blackstone's argument — and I think it's really compelling — is that's a lot of money to throw at a problem that you're not dealing with all the time. They've made a compelling business case. Throwing compute power at something is only going to get more and more common, and harder for companies to do." ◆

Essex is a freelance writer in Antrim, N.H.

COO KANTI PUROHIT (left) and CEO Ron Ranauro want to expand the use of compute farms in business.

Blackstone Technology Group

Location: 100 Grove St., Worcester, Mass. 01605

Telephone: (508) 793-2162

Web: *www.computefarm.com*

Niche: Compute farm software and services

Why it's worth watching: Technology provides cost-effective access to processing power for compute-intensive applications.

Company officers:
- Ron Ranauro, CEO and founder
- Rebecca Hyman, vice president of technology
- Kanti Purohit, chief operating officer

Milestones:
- 1996: Company founded
- 1999: Relaunched as a compute farm provider
- September 1999: ComputeFarm Advantage debuted

Employees: 57; 400% growth rate last year

Burn money: $3.4 million from Molehill Ventures, $15 million round under way

Products/pricing: ComputeFarm Advantage consulting services and 90 days' use of software, $25,000 to $250,000; software subscription, $12,000 to $80,000 per year thereafter, depending on CPU count; PowerCloud software for ASPs, $250,000

Customers: 3Com Corp., Biogen Inc., EMC Corp., Vertex Pharmaceuticals Inc. and others

Partners: Compaq, Sun, Veritas Software Corp. and others

Red flags for IT:
- Compute farm hardware vendors may beef up consulting efforts.
- Customer experience limited to a few vertical markets.

[the buzz]

STATE OF THE MARKET

Compute Farms vs. Server Farms

Compute farms approach the computing power of mainframes by aggregating servers into one large, virtual resource that's accessible by workstations and optimized to run large jobs that may take minutes or hours. They differ from server farms, which process large numbers of short bursts of transactions.

BTG claims that its expertise is in knowing how to configure a company's networked PCs and outfit them with special management, scheduling and performance-monitoring software. Its staff has expertise in compute-intensive scientific specialties like bioinformatics.

BTG says compute farms cost a fraction of what centralized Big Iron systems cost because they harness the computing resources of cheaper hardware. Decentralization across networked PCs produces additional benefits such as improved scalability (since capacity can grow in smaller increments than with mainframes) and reliability (because power failures and other hardware glitches won't bring down the whole system). Compute farms also let users retain the convenience and power of their desktop workstations rather than forcing them to access a mainframe.

Carrying the Load

The key piece of software in BTG's ComputeFarm Advantage isn't made by BTG. San Jose-based Platform Computing Corp.'s LSF Suite is the scheduler and load balancer, scheduling jobs at optimal times and shuttling them to the Unix and Windows NT systems with the most capacity.

BTG also offers Sun Microsystems Inc.'s Grid Engine load-sharing software. BTG's own SmartCache software and an extension, SmartBlast, distribute data across the compute farm, avoiding the bottlenecks that come from squeezing huge databases across low-bandwidth networks. A third BTG tool, SmartWatch, lets administrators monitor and optimize performance and bill for use of the farm.

BTG's security and privacy technology is a necessary component in making each user's system available to others, the company claims. "These resources might be on different workstations in different locations," says Chief Operating Officer Kanti Purohit. "You need a different concept of security." Finding industry-standard encryption tools inadequate, BTG invented what Purohit informally calls a "dynamic firewall" that runs on each system.

– David Essex

The Web's Master Builders

Charged with guiding a user's experience throughout a Web site, information architects are playing the critical role of turning functional Web sites into truly useful ones. By Minda Zetlin

LAST JULY, GoTo Auctions was knee-deep in problems. Part of Pasadena, Calif.-based GoTo.com Inc.'s portal site, Raleigh, N.C.-based GoTo Auctions is a "shopbot" for auction sites, allowing users to search hundreds of different auctions for specific items.

GoTo Auctions' flagship application, AuctionManager, had gotten unwieldy. Although it was a powerful program, with terrific functionality, customers weren't using it.

Fortunately, the talent needed to solve the problem was already in-house, in the form of Amber Link, a relatively new employee.

Link had come on board in March, when GoTo acquired start-up AuctionRover.com. As AuctionRover's content director, she had produced its weekly online magazine.

At GoTo, she knew she would need a new role. "Content wasn't really part of their business model," she says.

What GoTo Auctions needed, Link realized, was an information architect.

Information architects design the user's experience as he travels through a Web site. During the first few months after she joined GoTo Auctions, Link had been increasingly involved with information design and user-interface questions. With this user-centric approach, Link knew she could find out why users didn't like AuctionManager and determine what could be done to improve it.

Creating a New Job

At her request, she became GoTo Auction's first information architect. Her first, trial-run assignment: Fix AuctionManager's problems.

"The information architect is responsible for how information is distributed," notes Robert Egert, chief creative officer at Internet consultancy Xpedior Inc. in Chicago. "The goal is to identify the ideal user experience and specify what it will take to create that."

Information architecture is a new profession that's gaining recognition. Like GoTo Auctions, many companies create the title only after someone on staff discovers that an information architect is needed. Others know that's what they need and specifically recruit for that position. Complex e-commerce sites with many different products are especially likely to recognize the value of information architecture.

Salaries for information architects range from approximately $50,000 to $120,000, depending on experience and the location of the employer.

A related position called user interface designer or user interaction designer performs a similar function but at a less strategic level.

"Information architecture tends to be concerned with the whole, the structure of a site. Interaction design is more at the page level," says Peter Merholz, a user experience consultant in San Francisco. "It's like the difference between the person who designed the supermarket and the person who designed the checkout line bar code reader."

Just the Facts

Name: Amber Link
Age: 23
Title: Information architect
Employer: GoTo Auctions (part of GoTo.com Inc.)
Reports to: Director of product management

There is no formal training for information architects yet. And the people who fill this position come from various backgrounds: human factors, library science, graphic design, filmmaking and, sometimes, actual structural architecture. Some, including Link, come from editorial backgrounds.

Link says an editorial design job is the perfect training ground for an information architect's role.

When designing a newspaper page, she points out, you put the most important story at the top. Then you think about where you want the reader's eye to travel next and lay the page out accordingly.

"When I first got interested in information architecture, I knew these concepts existed in the world of print publishing," Link says. "I wondered if the same sort of research was being done for the Internet." Information architecture turned out to be the answer. "There's a lot of affinity between the two fields," she says.

Link began her work on AuctionManager by talking to the site's users, something she says not enough information architects take the trouble to do. "A lot of people act as proxies for the user," she explains. "They say, 'I read their e-mail.' " But that tells only half the story, she says: "By reading their e-mail, you'll find out what you're doing wrong but not what they really want."

As a result of her talks with users, she says, "We did a complete redesign. We wound up building a scalable application that really works." And the project was deemed a success when seller postings via AuctionManager increased 30%.

Validating the Need

Now, Link says information architecture is part of GoTo Auctions' development cycle. "Product management finds a need for a new product. With the help of our customer support staff, I validate that need. We talk to people and ask if they even want this feature — it could be really cool but doesn't meet their needs."

Her next step: "I draw out the basic idea of how a user would progress using this feature and do an interface design. Then we prototype those designs and ultimately test them with users," she says.

She says her role is to be a "starting gate" for product development. "Any idea goes through me, so I can make sure we build a great product. I also make sure things don't get out of control, and that we don't overload the user with information."

Egert says the growth of the information architect profession signals a new way of looking at software.

"In the old days, engineers designing pages would decide what they were going to be," says Egert. "They worked, and you could move through them, but they looked terrible. Then they'd get a [graphical user interface] designer. That would be like someone painting the side of a van to pretty it up. It's an inferior way of working.

"Software is an engineering thing. But users don't experience the software, they experience the user interface," Egert adds. "And in this new way of working, the experience is as important as the technology," he says. ▶

Zetlin is a freelance writer in Woodstock, N.Y.

rhic.com. **More than an IT job search connection.**

We don't just open doors, we arrange your passage through them.

No endless searches. No want ads. No worries. You can work contract or have us get you a full-time job. Either way the power is in *your* hands, where it belongs.

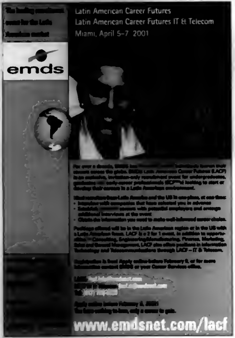
RHI CONSULTING
Technology Professionals
800 793 5533 • rhic com

For High Tech Jobs go to **www.dice.com**

dice.com
High tech jobs online

Call your
ITcareers Sales Representative
or Janis Crowley
1-800-762-2977

Computer Opportunities are available for consultants nationwide in the following areas: electronic commerce, object oriented technologies, Oracle SAP, Peoplesoft, J.D. Edwards, & legacy software conversion. Apply to Ref#636, HR Department, 1280 Wall Street West, Lyndhurst, NJ 07071.



Latin American Career Futures
Latin American Career Futures IT & Telecom
Miami, April 5–7 2001

For over a decade, EMDS has [illegible] across the globe. EMDS's Latin American Career Futures (LACF) is an exclusive, invitation-only recruitment event for undergraduates, graduates and early-career professionals (ECP™s) looking to start or develop their careers in a Latin American environment.

Meet recruiters from Latin America and the US in one place, at one time:

- Interview with companies that have selected you in advance
- Establish [illegible] contacts with potential employers and arrange additional interviews at the event
- Obtain the information you need to make well-informed career choice.

Positions offered will be in the Latin American region or in the US with a Latin American focus. LACF is a 2 for 1 event. In addition to opportunities in Consulting, Engineering/Manufacturing, Finance, Marketing, Sales and General Management, LACF also offers positions in Information Technology and Telecommunications through LACF – IT & Telecom.

Registration is free! Apply online before February 8, or for more information contact EMDS or your Career Services office.

LACF: [illegible]
[illegible]
Tel: [illegible]

Apply online before February 8, 2001!
You have nothing to lose, only a career to gain.

www.emdsnet.com/lacf

COMPUTER

At Lucent Technologies, we're defining the future of telecommunications. We're looking for individuals with a BS or MS and 1-2 years of directly related experience as a:

- Consultant
- Database Engineer
- Design Engineer
- Electrical Engineer
- Engineer
- Hardware Engineer
- IS Analyst
- IS Managers
- Network Analyst
- Phrase Development Analyst
- Process Engineer
- Product Engineer
- Product Market Engineer
- Product Validation Engineer
- Product Wireless Development Engineer
- Programmer
- Programmer Analyst
- RF Engineer
- Software Architect
- Software Developer
- Software Engineer
- Software Tester
- Systems Administrator & Integrator
- Systems Administrator

We seek expertise in the following:

- C/C++/UNIX
- CDMA
- Fiber Optics
- GUI Design
- Internet/Network Protocols/WinNT
- Object Oriented Methodologies/SmallTalk
- Oracle Development/Applications
- Quality
- RDBMS
- SAP
- Software Tools
- Switching Technology
- TCP/IP
- VB
- Wireless Telecommunications

Please send resume to
www lucent com/hireme
EOE

Talent is the fuel of the new economy.

ITcareers and ITcareers.com can put your message in front of 2/3 of all US IT professionals. If you want to make hires, make your way into our pages.

Fill up with ITcareers.

Call Janis Crowley or
1-800-762-2977

THE WORLD OF WORK IS CHANGING EVERY WEEK.

LUCKILY, WE ARE TOO!

For the most up to date opportunities and coverage, stay tuned in with us.

ITCAREERS

where the best get better

1-800-762-2977

SOFTWARE ENGINEER to design, develop, test, implement and maintain application software using C, Visual C++, Oracle Forms/Reports and MS-Access on Windows NT platform. Require M.S. degree in Computer Science/Engineering, or a closely related field with 1 year of experience in the job offered. Experience gained before or after earning the M.S. degree will be accepted. Salary: $63,500 per year. 8:30 am to 5:30 pm M-F. Apply by resume to Jack Patil, President, Amerous Global Software, 1900 The Exchange, Building 200, Atlanta, GA 30339; Attn: Job UI.

Systems Analyst. Duties: Design, develop & implement software applications using PowerBuilder, Oracle & Visual Basic. Resp. for front-end develop in PowerBuilder & middle tier develop with business rules, coding, testing & implementing business system enhancements & developing oper systems for Windows NT. Requires: M.S. (or foreign equiv.) in Comp. or Info Sci, Eng or related field. EOE. 40 hrs./wk; 9:00 a.m. to 5:00 p.m. Salary: $58,800/yr. Send resume (no calls) to: William W. Buhl, CTG, Inc., 6700 Old Collamer Rd., East Syracuse, NY 13057-1134.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in C++, Java, JavaScript and Oracle. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer; knowledge of C++, Java, JavaScript and Oracle. Salary: $124,800/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. James J. Mackin, Beaver Falls Job Center/TPCL, 2103 Ninth Avenue, Beaver Falls, PA 15010-3657. Job No. WEB145863.

Lucent Technologies with locations in New Jersey, Maryland, Pennsylvania, Ohio, Illinois, Texas and Florida is presently considering applicants for:

- Account Executives
- Applications Engineers
- Software Developers
- Software Engineers
- Wireless Communication Engineers
- Programmer Analysts
- Database Administrators
- Systems Administrators
- Project Managers
- Technical Managers

If you think you have what it takes to define the future of communications, join Lucent.

Fast resume to:
www.lucent.com/hireme

◆

Pr Anlst (Deerbrook, IL) Plan, dvlp, test bus applic progr, evaluate user requests, anlz, dvlp specifications/progr, review/alter progr, monitor performance, perform conversion. 40 hrs/wk, 9a-5p, $61,921.60/yr. BS in Comp Sci/Math/Eng & 2 yrs exp req'd. Exp must incl Oracle, Sybase, SQL forms, SQL Reportwriter, Unix, Sun Solaris, Cobol, SAS, MVS. Applicts must show proof of legal authority to work in US. Res to IL Dept of Empl Security, 401 South State St -7 North, Chicago IL 60605. Attn: B. Grunnet. Ref# V-IL-24543-P. An employer paid ad. NO CALLS - Send 2 copies of both res & cvr ltr.

Sun Technical Consultant - Forsythe Technology, Parsippany, NJ - Installation, maintenance and management of Sun Microsystems equipment. Administration, installation and configuration of Sun Microsystems using SunOS, Solaris, Sun Sparc, Sun Ultra and Sun Ultra Enterprise. Writing shell and Perl scripts. Development of proposals and technical presentations. M.S. in Computer Engineering and 2 years experience as a Systems Administrator required. Fax resume to Travis Hudgins at 847-675-8017. No calls please.

◆

COMPUTER
** CALIFORNIA **

- **Web Architects/Programmers/Analysts (Java/Servlets/EJB-C++/CORBA/UNIX)**
- **Outsourcing Architects & Delivery Mgrs.**
- **Healthcare Project /Product Managers.**
- **QA Engineers**

Email: saic-usa@tfic.com
Ref: SWC

SAIC

WWW.SAIC.COM

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in MFG/PRO, Progress 7.3 and Progress 4GL. Requirements: Bachelor's Degree, functional equivalent or educational equivalent in Computer Science or related field and one year of experience as a software engineer or computer programmer; knowledge of MFG/PRO, Progress 7.3 and Progress 4GL. Salary: $81,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Joseph Stratico, Director, Pittsburgh/Allegheny Co. Careerlink, 425 Sixth Avenue, Suite 2200, Pittsburgh, PA 15219. Job No. WEB145834.

Software Engineer (multiple openings). Design, develop and implement computer software systems using PeopleSoft and related software. Work requires extensive travel and frequent relocation. Must have 1 year in the job offered or as a computer professional and 1 year of experience using PeopleSoft and related software. Bachelors degree in Computer Science/Applications, Engineering, Math, Physics, Chemistry or business related field. Salary is $85,000.00 per year 9am - 5pm. Send resumes, referencing Job Order WEB 92192, to Mr. Joseph Stratico, Director, Pittsburgh/Allegheny Co. CareerLink, 425 Sixth Avenue, Suite 2200, Pittsburgh, PA 15219. Please reference job order number WEB 145823.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Java, JavaScript, C++ and Oracle. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer; knowledge of Java, JavaScript, C++ and Oracle. Salary: $66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. James Mackin, Beaver Falls Job Center/TPCL, 2103 Ninth Avenue, Beaver Falls, PA 15010-3657. Job No. WEB145838.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Cold Fusion 4.0, Oracle 8.0, CFML and JavaScript. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer; knowledge of Cold Fusion 4.0, Oracle 8.0, CFML and JavaScript. Salary: $66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Ms. Barbara Cole, Greene County Team PA Careerlink, 4 West High Street, Waynesburg, PA 15370-1324. Job No. WEB145860.

COMPUTER
** San Mateo / San Rafael **

Java/OO Architects
Java Programmers/Engineers
(Servlets/EJB/J2EE – GUI)
Oracle DBA / Developers

Product/Project Managers
WEB Applications Support
Analyst
Clinical Trials Analyst &
Consultant

Email: jobs@fast-track.com
Ref: sfoh

fast track

www.fast-track.com

Database Coordinator Chicago, IL. Maintain Informix database engine including configuration and disk space allocation. Design and maintain tables and indexes for Informix databases. Program and test SQL functions & reports for departments that use Informix database. Bachelor's Degree in Computer Information Systems or equivalent and six months training in Informix. Salary: $32,000.00 per yr plus $25.00 per hour for overtime. 40hrs/wk; 8:30 am/4:30pm, M-F. Applicants must show proof of legal authority to work in the U.S. Send resumes to ILLINOIS DEPARTMENT OF EMPLOYMENT SECURITY, 401 South State Street - 7 North, Chicago, Illinois 60605. Attn: Joanne Breaux. Reference # V-IL-23158 - N. AN EMPLOYER PAID AD. NO CALLS - SEND 2 COPIES OF BOTH RESUME & COVER LETTER.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in ASP, SQL Server and Visual Basic 6.0. Requirements: Bachelor's Degree, functional equivalent or educational equivalent in Computer Science or related field and knowledge of ASP, SQL Server and Visual Basic 6.0. Salary: $70,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Tom Dembosky, Indiana Job Center, 350 N. Fourth Street, Indiana, PA 15701-2000. Job No. WEB145846.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in MFG/PRO, Progress 7.3 and Progress 4GL. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer; knowledge of MFG/PRO, Progress 7.3 and Progress 4GL. Salary: $75,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Ms. Mary Pat Curran, McKeesport/Allegheny Co. Careerlink, 245 Fifth Avenue, McKeesport, PA 15132-3600. Job No. WEB145848.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Visual Basic 5.0, Oracle 7.0 and Crystal Reports. Requirements: Bachelor's Degree, functional equivalent or educational equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer; knowledge of Visual Basic 5.0, Oracle 7.0 and Crystal Reports. Salary: $68,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Ms. Sue Notarnicola, Fayette County Team PA Careerlink, 32 Iowa Street, Uniontown, PA 15401-3513. Job No. WEB145855.

- WEB/OO Architects/Pgmrs. (Java/J2EE/EJB/Servlets – C++/CORBA/UNIX)
- SILVERSTREAM Devlprs.
- Sr. ORACLE Specialists
- Siebel, PeopleSoft, Vantive & Actuate Devlprs/Bus. Analysts
- e-Business/Project Mgrs.

Email: admin@ttir.com
Ref: sa/fl www.ttir.com
Tri-Tec Int'l Resources, LLC

Senior Software Engineer (multiple openings): Design, develop and implement computer software systems to determine feasibility of design and directs software testing procedures, programming and documentation. Work involves extensive travel and frequent relocation. Must have one year of experience using: 1 of Group A and 1 of Group B and 1 of Group C, OR 2 of A and 1 of B, OR 2 of A and 1 of C as follows: Group A - DB2, IBM3090, IBM ES9000, MVS, IMS, IDMS; Group B - CL/400, CICS, TSO, VSAM; Group C - TELON, COBOL, JCL, AS/400, RPG/400, COBOL/400. Master's degree in one of several limited fields: Computer Sci/Apps, Eng., Chem., Math or Physics. Will accept Bachelors with 5 years of progressive experience as a computer professional. Salary of $75,000 per/yr. 40 hrs/wk., 8:00-5:00 p.m. Please submit resumes to: Mr. Anthony Gallardo, Manager, Westmoreland County Career-Link, 300 East Hills Street, Youngwood, PA 15697-1806. Reference Job Order No. WEB 145806.

City of Kansas City, Missouri
Two openings for Software Analysts
Candidates must have a Bachelor Degree (or equivalent) in Computer Science or a directly related field and two years of experience in Systems Programming/Analysis to include SMP/e installation in OS/390 environment. Must have working knowledge of CICS, DB2, SMS, RACF, TCP/IP, Unix System Services, COBOL/Assembler, Computer Associates Software and Compuware Software; must reside within the City limits of Kansas City, Missouri or establish residency within the City limits within 6 months of appointment. EOE. Send ad, cover letter and resume to Dan Eatherton, IT Department, City of Kansas City, Missouri, 3d floor, 1111 Locust Street, Kansas City, MO 64106.

Director of Research and Development. Will solicit and interpret software design needs from clients in the restaurant and hospitality industry, focusing on POS. Will set design specifications for restaurant industry software and provide hands on management of project from beginning to end, including development, coding, and testing, using an Object Oriented Programming Language. Will also provide installation and customer support to restaurant management. Will provide ongoing interface with clients and supervise marketing efforts. Must have bachelor's degree in computer science or related field, or equivalent work experience, plus six years experience in software development. Please fax resume to Jeff Henry at 704-333-8979 or email to JHenry@calsdev.com.

Consultant. Design, develop, implement & test software for management information systems using client/server & object-oriented techniques. Web development. Tools: C, C++, UNIX, Windows NT, SQL, Java. MS in Comp. Sci., Math, Physics or Electrical Eng.* + 1 yr exp in job offered or as System or Staff Analyst req'd. (*MS in any engineering field + 1 yr exp in software development also acceptable.) Previous exp must include: C, C++, UNIX, SQL. 40hrs/wk, 9am-5pm, $67,000/yr. Applicants must show proof of legal authority to work in the U.S. Send 2 copies of resume & cover letter to Illinois Dept. of Employment Security, 401 S. State St.-7 North, Chicago, IL 60605. Attn: Leonard Bulisa. Ref# V-IL 24692-B. Employer Paid Ad. No calls.

Software Engineer. Analyzes, designs, develops, implements, tests and supports advanced software systems for global manufacturer of medical diagnostic imaging equipment. Participates in concept development and analyses. Works on cross-functional engineering teams to design and develop software to support one or more modalities, such as magnetic resonance (MR), computed tomography (CT), ultrasound, x-ray and/or other types of medical diagnostic equipment. Works on maintaining, modifying, enhancing existing software systems. Stays abreast of emerging technologies and recommends software system alternatives. Utilizes and incorporates Six Sigma methodology into the software development process when applicable. Provides technical support during the entire lifecycle of a software project. Required is a Master of Science degree in Computer Science or Electrical Engineering and two (2) years of experience in the position being offered (i.e., Software Engineer) or two (2) years of experience as an Engineer or Graduate Research Assistant. As part of the required experience in the position being offered or in the related occupation, the applicant must have had experience in medical imaging application development, had experience in designing and developing software utilizing various programming languages, including C/C++, Java, OpenGL, had experience working with Unix and NT platforms, and had experience with object-oriented design methodology. Monday through Friday, 8:00 am to 5:00 pm, 40 hours per week; $85,000 annually. Qualified applicants may submit two (2) copies of resume and cover letter to Chai Phoulavan, File #C101837, DWE-ALC, PO Box 7972, Madison, Wisconsin 53707-7972. Reference File #C101837.

Director

Candidate's responsibilities will be in the field of new program development for commercial Real Estate. A thorough understanding of real estate financial instruments and fixed income capital markets is required, combined with a BS and 8 years of experience (advanced degree desirable). Candidate will participate in the digitization of related business processes and develop business strategies, financial models and other computer applications required for the operation of these new programs utilizing C, C++, JAVA, and SAS. Specifically, a knowledge of mortgage backed securities and commercial real estate lending is necessary as well as a functional understanding of computer applications including data base and networking structures. When applying for the above position, please send resume via email to opportunities@gecareers.com (ASCII text preferred) or mail it to: GE, Suite #2, PO Box 54923, Waltham, MA 02454-9231. Please refer to GECRE/240687/AN030 in the subject line of your email message or on your cover letter. An acknowledgment letter will be sent to confirm receipt of your resume into our electronic database. An Equal Opportunity Employer.

Computer Graphic Designer. Job location: New York, NY. Duties: Resp. for the day-to-day site design & creation & for all tech. aspects of web sites for clients, incl. performance issues such as speed of access & for approving site content. Use HTML (Hyper Text Mark-Up Lang.) to focus primarily on files within an internet document root. Create & develop visually aesthetic graphics using 3D computer graphics design & write text for web sites. Create links to other web sites. Actualize creative vision into graphical screen designs & all graphical interface elements for internet & new media projects. Implement design detail of interactive screens, object construction, model sculptures & texture maps as well as the overall balance of elements. Requires: Bach's in Fine Arts, Graphic Design or related field & 6 mths. exp. in the job offered or 6 mths. exp. as a Graphic Designer. Coursework must incl. classes in graphic design & three dimensional design. Exp., which may have been obtained concurrently, must incl. 6 mths. exp. creating & developing graphics using 3D graphics design. EOE. 40 hrs./wk., 8:00 a.m. to 5:00 p.m. Salary: $74,214/yr. Send resume (no calls) to: Molly Stone, CTG, Inc., 800 Delaware Ave., Buffalo, NY 14209-2094.

Software Eng (multiple openings). Design, develop, and implement software systems, analyze software reqts, direct software sys. testing procedures, programming and documentation. Two yrs of exp. in job offered or as a comp. prof including two yrs of exp using 1 of Group A and 3 of Group B OR 2 of A and 2 of B, as follows: Group A – Oracle RDBMS, Designer 2000, Developer 2000, Oracle Applications; Group B – Oracle Forms, Oracle Reports, SQL*Plus, Pro*C, PL/SQL, SQL*Forms, SQL*Reports. Work requires travel and reloc. Bachelors degree or foreign equiv. in one of several ltd fields: Comp. Sci/Apps, Eng., Chem., Math or Physics or scientific related field. Salary $70,000 per/yr. F/T. Please submit resumes to: Crawford County Team PA CareerLink, Ms. Barbara Hogan, Mgr., 764 Bessemer St., Meadville, PA 16335. Reference Job Order No. WEB 143700.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in Java, JavaScript, C++ and Oracle. Requirements: Bachelor's Degree or equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer; knowledge of Java, JavaScript, C++ and Oracle. Salary: $67,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Terrance Kinney, Armstrong County Team PA Careerlink, 735 [illegible] Street, PO Box 759, Kittanning, PA 16201-0759. Job No. WEB145850.

Senior Software Engineer. Req. bachelor's degree in computer science or a related field. Related fields include Physics, Mathematics, Engineering and Management Information Systems. Must have 2 yrs. exp. in the job offered or in computer database programming in Visual BASIC. All of stated exp. must involve use of Watcom SQL, PL/SQL and Oracle as a database. Perform computer database programming, including design, development and testing of customized Visual BASIC modules to complement company's unique Cornerstone software Program, design, configure, develop, test, analyze and modify software for various clients using Visual BASIC, Watcom SQL, PL/SQL and Oracle database. Provide product support and computer engineering maintenance for clients. 40 hours/wk. 9:00 a.m. - 5:00 p.m. Salary range $67,000 to $75,000/yr dep. on edu. & exp. Apply with resume to: Contracts Administrator, SYMAVANT inc., 3445 Peachtree Road, Suite 1400, Atlanta, GA 30326.

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications; analyze software requirements to determine feasibility of design; direct software system testing procedures using expertise in ASP, Visual Basic and SQL Server. Requirements: Bachelor's Degree, functional equivalent or educational equivalent in Computer Science or related field and two years experience as a software engineer or computer programmer; knowledge of ASP, Visual Basic and SQL Server. Salary: $66,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Ms. Margaret Weckerly, Butler County Job Center, 227 West Cunningham Street, PO Box 951, Butler, PA 16003-0951. Job No. WEB145809.

Datamatics provides the opportunity for quality software professionals to be part of exciting high tech projects across most of the U.S. Our clients include many Fortune 500 companies, including IBM, Oracle Consulting Services, MCI, Unisys Corp., Walmart, PricewaterhouseCoopers, Wells Fargo, etc. We are currently looking for dedicated software professionals to join our team of consultants. We are recruiting IT Professionals at all levels with:

MS/BS or equivalent & relevant work experience or at least 2 years experience in some of the following areas:

• Oracle Developer/DBA.Visual Basic/MS Access • JDE one world • C, C++, SmallTalk, JAVA, JSP, EJB, SWING, HTML, Cold Fusion, ASP, CORBA, Visual Interdev. • WAP, WML. • Oracle Financials/Oracle Manufacturing. • Sybase Developer/DBA. • POWER Builder. • Progress, MFG PRO. • Informix Developers/DBA. • Lotus Notes Developer/ADMIN •Dataware Housing. •E-Commerce Analyst. •Technical Resource Analyst
- UNIX Administrators
- SQL Server DBA
- SIEBEL/REMEDY
- LANSA • CITRIX

Candidates must be willing to relocate. We offer very attractive salaries, benefits, and relocation assistance. Kindly e-mail, fax or mail resumes to address below.

Information Architect: Leads projects to improve business processes and products by driving Six Sigma strategy and deploys Information Technology solutions across the company. Applies Six Sigma tools to increase productivity and customer satisfaction, and/or improve quality of the company's products, software applications, and IT infrastructure. Translates business needs into Information Technology projects. Oversees IT projects with Six Sigma rigor. Uses Six Sigma methods to design products and processes using statistical tools, the Design of Experiments, Quality Function Deployment, Failure Modes and Effects Analysis, and monitors programs using Six Sigma scorecards. Manages programs that require cross-functional, global and customer interaction. Mentors other IT team members on current technology, Six Sigma, and company quality processes. Drives change in the company's using tools like CAP (Change Acceleration Process) and Workout. Required is a Master's degree in Business Administration (Management Information Systems), Computer Science, or Electrical Engineering and two (2) years of experience in the position being offered (i.e., Information Architect) or two (2) years experience as a Systems Analyst. As part of the required experience in the position being offered or in the related occupation, the applicant must have had experience in analyzing, designing, developing, implementing, and supporting software and/or IT solutions to support various business functions; had experience in Information Technology (Client-Server web applications, data modeling, ERP packages, EAI packages) and business process change; had experience in project management, problem solving, analysis, communications, change orientation, and had experience with Six Sigma tools. Monday through Friday: 8:00 am to 5:00 pm; 40 hours per week. $64,000 annually. Qualified applicants may submit two (2) copies of resume and cover letter to: Char Phoutavan, File #C101[illegible], DWE-ALC, PO Box 7972, Madison, Wisconsin 53707-7972. Reference File #C101[illegible].

SENIOR SAP FUNCTIONAL ANALYST. Perform duties as Co-team leader for implementation of Project Systems, Asset Management and Investment Management SAP modules. Design and implement company-wide information systems for client needs involving international business units requiring information for Capital Planning, Budgeting, Cost Estimating and Execution. Redesign current business processes for the Engineering, Procurement and Construction industry. Prototyping and configuring the SAP package to provide automatic updates for financial and project tracking modules thereby increasing efficiency and productivity. Organize, conduct and control fieldwork within the work plan. Using SAP modules, perform business area analyses including feasibility studies and business plans. Design and implement workshops and training programs on the SAP system for client personnel and conduct performance reviews as needed. Analyze and resolve problems encountered by client with SAP system. Prepare training manuals and other written documents to assist client personnel in the use of the SAP system. Design interface for SAP system modules and existing client systems to achieve optimum integration. 40 hrs/wk. Bachelor's Degree or equivalent in Computer Science, Engineering or Economics AND Master's Degree or equivalent in Management or Business. Travel required up to 100% of the time to client sites throughout the U.S. Relocation may be required for longer assignments. 1 yr. exp. in job offered or 1 yr. related exp. as a SAP Implementation Team Member. $90,000/yr. Apply at the Texas Workforce Commission, HOUSTON, Texas, or send resume to the Texas Workforce Commission, 1117 Trinity, Room 424T, Austin, Texas 78701. J.O. #TX1154291. Ad Paid by An Equal Opportunity Employer

---

SOFTWARE ENGINEER

Software engineer to design, develop and test computer programs for business applications, analyze software requirements to determine feasibility of design, direct software system testing procedures using expertise in SAP R/3, Oracle 7.0 and ABAP/4. Requirements: Master's Degree or equivalent in Computer Science or related field and one year of experience as a software engineer or computer programmer; knowledge of SAP R/3, Oracle 7.0 and ABAP/4. Salary $66,000/year. Working Conditions: 8:30 A.M. to 5:30 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Mr. Anthony Gebicki, Westmoreland County CareerLink, 300 East Hills Street, Youngwood, PA 15697-1808. Job No. WEB145642

Syst An (Oakbrook, IL) Define req'ments for replacing, improving, testing syst dsgn IT syst to meet user req'ments, dvlp cost effective recommend; understand bus req'ments for syst improvements; perform syst analysis, feasibility study, plan new/revised syst; prep specifications for new/revised syst; define syst security & control procedures. 40 hrs/wk. 9A 5P. $82,000/yr. BS in Comp Sci/Math/Eng/Operation Research & 3 yrs. exp req'd. Exp must incl PB C/C++, Perform. Tuning for PB & SQL, Oracle Database Server, Win NT, Unix, Novell Netware, OOPS. Applicants must show proof of legal authority to work in US. Res to IL Dept of Empl Security, 401 South State St -7 North, Chicago, IL 60605. Attn: B. Grunnet, Ref # V-IL-24544. An employer paid ad. NO CALLS - Send 2 copies of both res & cvr ltr.

Instructional Designer/Programmer: Provide software/hardware training & documentation solutions/services for Fortune 500 companies to support & enhance the performance of their end users. Responsible for the analysis, physical development, media preparation, production & coordination of computer based training environments for clients. Design & develop customized multi-media computer based training (CBT) programs for clients using Authorware. Work with Project Manager to assess client training needs & provide necessary training &/or instruction to client-users. Determine project scope & media utilization, conduct task analysis & specify learning objectives. Develop assessments, create content treatments & identify external resources as required. Prepare written materials including job aids, procedure charts, program documentation & instructional guides. Perform multimedia programming, scripting & testing in a PC environment. Create & edit graphics & audio files using photoshop & soundforge. Some projects performed at client sites in various geographic locations requiring travel to &/or temporary placement at a client site. Must have a Bachelor's degree in Computer Science or Instructional Design. Must have at least six months of experience in the job offered or as a Programmer. Experience as a Programmer must include 1) design & development of customized multi-media computer based training (CBT) program using Authorware, 2) creation & editing of graphics & audio files using photoshop & soundforge, & 3) preparation of written materials including job aides, procedure charts, program documentation & instructional guides. Experience requirement can be satisfied through academic or professional experience. Resume required. 40 hrs/wk, 8:00am - 5:00pm. $42,500/yr. Overtime required as needed at $22.13/hr. Applicants must have proof of legal authority to work permanently in the U.S. Send resumes to the ILLINOIS DEPARTMENT OF EMPLOYMENT SECURITY, 401 South State Street - 7 North, Chicago, Illinois 60605. Attention: Leonard Boksa, Reference # V-IL 24863-B. AN EMPLOYER PAID AD. NO CALLS - SEND 2 COPIES OF RESUME.

◆

MFG/PRO SR. SYSTEMS ANALYST

Assembleon America, a member of the Philips group of companies, is seeking a highly talented self-starter to join its dynamic IT team of professionals.

Responsibilities:

- Provide daily support for MFG/PRO ERP business system environment & recommendations for improvement
- Routine maintenance UNIX admin & fine-tuning database structure
- Evaluate & test QAD products
- Organize & schedule product upgrades & system patches

Requirements:

- Bachelor's degree in CS, Engineering or related area
- 2+ yrs exp as Systems Analyst, Software Engineer or Programmer Analyst
- 2 yrs MFG/PRO or other ERP admin exp & progress programming a MUST

We offer a competitive salary & comprehensive benefit package. Please send conf'l resume incl salary history/req'l, to HR, Assembleon, 5110 McGinnis Ferry Rd., Alpharetta, GA 30005.

FAX 770-751-4578
www.assembleon.com
EOE M/F/D/V

SAP Consultants
(all modules)

If you're an experienced SAP Consultant interested in working with some of the best people in the industry, RSI-Novasoft has an excellent career opportunity for you. In our fast growing and international consulting company with offices in the USA, Europe and Asia and with 100% commitment to SAP you will be able to increase your skills while adding value to our business.

You'll also enjoy a very attractive compensation and benefits package as well as an open team environment. Travel will be required.

To apply, send resume to:
RSI-Novasoft LLC
1250 Bayhill Drive, Suite 121
San Bruno, CA 94066
FAX 650 888 5809
Email
HRUS@[illegible]group.com
EOE

www.novasoftgroup.com

R S Software is a leading, globally positioned company with software development facilities in the US and India. R S Software has ongoing opportunities across the USA for experienced software professionals.

SOFTWARE PROFESSIONALS:
JAVA, JAV Scripts, JAVA Servlet, ASP, CORBA, HTML
DBA Oracle SQL Server DB2
VC++ /C++ MFC COM/DCOM OOD, MS SNA Server
Unix C/C++ OOA OOD
COBOL CICS DB2
Systems Administrators: Unix, Solaris, AIX, Windows NT
Security and Firewalls Administrators
Oracle 8i Developer 2000/Designer 2000, C/Pro*C, Unix/Windows NT
MS SQL Server Visual Basic 6.0, Visual InterDev
IEF/COOLGEN
TPF
Peoplesoft HR & Payroll modules

Also need
HUMAN RESOURCES
Executive-Personnel Manager
Generalist/Recruiter
TECHNICAL SALES SUPPORT MANAGER

For a challenge, and competitive compensation.
Please FAX CV to: 408-362-0080
Attn: RST 101
RS Software (India) Ltd
1900 McCarthy Blvd. # 100
Milpitas, CA 95035

Senior Software Engineers (multiple openings). Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation using relational data base management systems (RDBMS). Work involves extensive travel and frequent relocation. Must have 1 year of experience using 1 from Group A and 2 from Group B OR 1 from A and 1 from B and 1 from C OR 1 from A and 2 from C. A) DB2, FoxPro, Informix, Ingres, MS Access, Oracle, Paradox, Sybase and Unify. B) AIX, DOS, HP-UX, MVS, Novell, OS/2, Sun OS, UNIX, VAX/VMS, Windows. C) 4GL, APT, C, C++, COBOL, Case Tools, C Shell, Crystal Reports, E-SQL, Easytrieve, JAVA, ODBC, PowerBuilder, PowerDesigner, Power J, Power++, S-Designer, SQL, Shell Script, Visual Basic. Master's degree in one of several limited fields: Computer Sci/Apps, Eng, Chem, Math, Physics or a scientific or business related field. We accept Bachelors degree with five years of progressive experience as computer professional. Salary is $75,000 per/yr. 40 hrs/wk. 9:00-5:00 p.m. Please submit resumes to: Ms. Margaret Weckerly, Actg. Manager, Butler County Job Center, 227 West Cunningham Street, PO Box 951, Butler, PA 16003-0951. Job Order No. WEB145673

Emerald Solutions, Inc. Great opportunities at a dynamic NATIONAL consulting firm.

Software Engineers
Must have a Bachelor's Degree in Computer Science or related field and a minimum of 5 years related progressive work experience.

Programmer Analysts
Must have a Bachelor's Degree in Computer Science or related field or the equivalent education and experience.

We have offices in Birmingham, AL, Phoenix, AZ, Walnut Creek, CA, Denver, CO, Chicago, IL, Stamford, CT, Alpharetta, GA, Boston, MA, Warren, NJ, New York, NY, Portland, OR, Dallas, TX, Vienna, VA, and Bellevue, WA.

Send resume, including location preference to:

Emerald Solutions, Inc.
Ref#CWAD01
111 SW 5th Ave., #2700
Portland, OR 97204
E-mail:
cwad01@emeraldsolutions.com
EOE

Computer Sciences Corporation (CSC)
Career Opportunities.

Colorado, Delaware, Illinois, New York, North Carolina, Texas, Virginia
Consider the following openings for systems development/consulting/management positions.

Colorado
Sr Computer Scientist
Delaware
Programmer/Analyst/
Sr. Programmer Analyst
Computer Scientist
Illinois
Network Administrator
New York
Computer Scientist
North Carolina
Vice President, I/T Global Accounts
Texas
Sr. Programmer/Analyst
Virginia
Knowledge Team Coordinator

Travel may be required. Salary DOE. Send ad & resume to: Ad# 31281-7, Attn: Patty McNally, 2100 East Grand Avenue, El Segundo, CA 90245. **Please indicate specific title/location of job for which you are applying on your application letter.**

A/BAP PROGRAMMER (Systems Programmer) Responsible for gathering, analyzing and evaluating information about existing or proposed A/BAP programming requests, developing new A/BAP programs and maintaining existing A/BAP programs, preparing and submitting specifications and time estimates for management approval, writing and implementing A/BAP programs, instructing personnel in use of A/BAP programs, supporting system interfaces, forms, layouts, and applying OSS notes. Requires M.S. Degree in Computer Science or Telecommunications, plus a minimum of two years of work experience in job offered or in Systems or Applications Engineering, inc. experience in SAP ERP system, A/BAP/4 Data Dictionary, A/BAP Editor, Screen Painter, Menu Painter and SAP Script. 40 hrs per week, 8:00 am - 4:45 pm, Monday - Friday. Job site: Lexington, SC. Salary $70,000/year. Send resume to Thomas J. Koemats, Director of Human Resources, Cooper Tools, 670 Industrial Drive, Lexington, SC 29072. All applicants must have legal right to work in the US.

WE DO A BETTER JOB AT HELPING YOU GET ONE.

itcareers.com

HP Unix Support Analyst (multiple openings) Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation using HP Unix. Work requires extensive travel and frequent relocation. Must have one year of experience using HP Unix as follows: 1 of A and 1 of B, or 2 of A, or 2 of B. A) RS/6000(S-70, R-50, F50, J40, R40, R20, 99K, 520H, 340H, 320H, 43P140/240, C-10), Sun Sparc, Sun Ultra, SUN Enterprise (220R, 250R, E3000, E3500, E4000, E5000, E7000, E10000), HP 9000(K-Series, D Series). B) Logical Volume Manager, IBM RAID, SSA, TCP/IP, SUN CLUSTER, HIGH Availability, SUN RAID, Veritas Volume Manager, NIS, NIS+, NFS, MC Service Guard, HP Overview. A Bachelors degree or foreign equivalent in one of several limited fields: computer science/applications, engineering, chemistry, mathematics, physics or a scientific or business related field. Salary is $75,000.00 per year. 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to Ms. Barbara Cole, Supervisor, Greene County Team PA CareerLink, 4 West High Street, Waynesburg, PA 15370-1324. Reference Job Order No. WEB 145819

Software Engineer (multiple openings): Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation using relational data base management systems (RDBMS). Work involves extensive travel and frequent relocation. Must have 1 year of experience using 1 from Group A and 2 from Group B OR 1 from A and 1 from B and 1 from C OR 1 from A and 2 from C. A) DB2, FoxPro, Informix, Ingres, MS-Access, Oracle, Paradox, Sybase and Unify. B) AIX, DOS, HP-UX, MVS, Novell, OS/2, Sun OS, UNIX, VAX/VMS, Windows. C) 4GL, APT, C, C++, COBOL, Case Tools, C Shell, Crystal Reports, E-SQL, Easytrieve, JAVA, ODBC, PowerBuilder, PowerDesigner, Power J, Power++, S-Designer, SQL, Shell Script, Visual Basic. Bachelors degree in one of several limited fields: Computer Sci/Apps, Eng, Chem, Math, Physics or a scientific or business related field. Salary is $66,000 per/yr. 40 hrs/wk. 9:00-5:00 p.m. Please submit resumes to: Ms. Thomas C. Dembosky, Manager, Indiana Job Center, 350 North Fourth Street, Indiana, PA 15701-2000. Please Reference Job Order No. WEB 145810

Senior Software Engineer (multiple openings). Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation. Work involves extensive travel and frequent relocation. Must have one year of experience using 1 of Group A and 1 of Group B and 1 of Group C, OR 1 of A and 2 of B, OR 1 of A and 2 of C as follows: Group A - Windows 3.1, Windows NT, Windows 95, Windows 98, Unix, HP-UX, IRIX, Sun OS; Group B - Visual C++, Visual C, C, C++, Visual Basic, PowerBuilder; Group C - JAVA, TCP/IP, HTML, MFC, CGI, PERL, ASP, COM/DCOM, Active X, MTS. Master's degree in one of several limited fields: Computer Sci/Apps, Eng., Chem., Math or Physics. Will accept Bachelors degree with five years of progressive experience as computer professional. Salary is $75,000 per/yr. 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to: Ms. Mary Pat Curran, Supervisor, McKeesport/Allegheny Co CareerLink, 345 Fifth Ave., McKeesport, PA 15132-2600. Job Order No. WEB145884

SENIOR NETWORK PLANNING ANALYST to perform all tasks related to UNIX (Solaris) systems administration and RDBMS administration (Oracle and UDB); Design and implement backup and recovery strategies for mission critical databases (Oracle, UDB) and UNIX (Solaris) systems; UNIX and TCP/IP administration to maintain security and high availability for databases; Performance management of databases and UNIX servers; Research and develop high availability services for UDB databases under Solaris operating system, and resolve Solaris and RDBMS interaction related issues; Develop utility programs using Shell programming to monitor critical databases and UNIX systems events. Require: B.S. degree in Computer Science, an Engineering discipline, or a closely related field, with two years of experience in the job offered or in a related occupation involving database/systems administration. Full-or part-time equivalent experience will be accepted. Competitive salary offered. Send resume to: Katherine Crew, VP, Human Resources, Equifax, Inc., 1550 Peachtree St. NW, Atlanta, GA 30309. Attn: Job NP.

Software Engineers (multiple openings). Design, develop and implement software systems to determine feasibility of design and directs software testing procedures, programming and documentation. Work involves extensive travel and frequent relocation. Must have one year of experience using: 1 of Group A and 1 of Group B and 1 of Group C OR 1 of A and 2 of B, OR 1 of A and 2 of C as follows: Group A - Windows 3.1, Windows NT, Windows 95, Windows 98, Unix, HP-UX, IRIX, Sun OS; Group B - Visual C++, Visual C, C, C++, Visual Basic, PowerBuilder; Group C - JAVA, TCP/IP, HTML, MFC, CGI, PERL, ASP, COM/DCOM, Active X, MTS. Bachelor's degree or foreign equivalent in one of several limited fields: Computer Sci/Apps, Eng., Chem., Math or Physics. Salary is $66,000 per/yr. 40 hrs/wk., 9:00-5:00 p.m. Please submit resumes to: Ms. Sue Netermole, Supervisor, Fayette County Team PA Career Link, 32 Iowa Street, Uniontown, PA 15401-3513. Job Order No. WEB 145815

Exp'd IT professionals in a or b or c or d or e or f or g or h req'd (a) Java, JBoss2.0, Java/WebServer, Jbuilder, JavaScript (b) Prolog, Pro*C Web Requisitions, Oracle Financials 10.7, Winnt, Oracle Web Apps. (c) Java, XML, Websphere, BEA WebLogic Application Server, Netegrity SiteMinder, Apache Web server (d) IDMS/R, Vbscript, Javascript, Adabas, Panvalet, OLQ, DMLO, Groupwise. (e) UML, Visual Basic, Uniface (4GL), ASP, VbScript, JScript, JDK, S-Designer, PFC, (f) HP UX/Winnt, HP9000, Oracle Financial 10.7, Pro*C, Oracle Project Accounting, Oracle Self Service Web, (g) Star Xenix, Prism, Veritas Unix Admin, Shell Scripts (ksh, csh), (h) Java, AutoLISP, UNIX v3.2, SQL Server 6.5/7.0, Omni Enterprise 4.5. Travel req'd. Plse send resume & salary reqmnts. to HR, CoordSoft International, Inc. 47 Perimeter Center East, Suite 305, Atlanta, GA 30346.

Nexgenix, a leading supplier of innovative, end-to-end e-Business consulting services, is seeking technical architects, developers, designers, analysts, project managers and strategists. Qualified candidates must possess a minimum of a Bachelor's or Master's degree and/or comparable experience. Opportunities are available at all of our locations, including California, Georgia, New York, New Jersey, North Carolina and Florida. For information please visit our website at www.nexgenix.com or send resume to:
careers@nexgenix.com

ShaktiSoft, Inc., a national computer consulting company requires following skills for various computer software positions:

- C, C++, Java, JavaScript, CGI/PERL, SQL, Pro*C, XML, HTML
- Visual Basic, ASP, Visual C++, MFC, Windows SDK, Power Builder, Crystal Reports, IIS, ISAPI, Active-X, NSAPI
- OOA/D, COM/DCOM, Corba, Rational Rose, UML
- Oracle, MS SQL Server, Informix and Sybase developers/administrators
- Unix, Linux, Windows NT/2000 system and network administrators,
- Packaged Solutions (SAP, Oracle Applications, PeopleSoft, Baan)
- COBOL, CICS, IDMS, MVS, IDMS, AS/400, RPG/400
- SQA Suite, Win Runner, Load Runner, MS Test, White/Black Box Testing
- VxWorks, RTOS, pSOS, SNMP, TCP/IP, Assembly, Telecom
- DSP, ATM, Frame Relay, ASIC design, VHDL, SAS, ISDN, Routers
- PC Support, Help Desk, HP OpenView, Technical Writers

Positions are based in our Fremont, California office, but will require travel throughout the country. Qualified applicants must have a bachelor's degree plus two years relevant experience. Positions offer competitive salaries and benefits packages. For consideration, submit resumes to: Shaktisoft, Inc., ATTN: RECRUITMENT, 43216 Christy Street, Fremont, CA 94538. EOE

CyberTech Systems provides IT strategy consulting, systems integration and software development to clients nationwide. We have immediate, full-time opportunities for both entry-level and experienced professional in any of the following areas:

SAP R/3
- Functional (Financials, Logistics, HR)
- Technical (BASIS, ABAP, ALE/EDI)

NETWORKING
- Systems Engineers (MCSE)
- LAN/WAN Specialist (CISCO)

APPLICATION DEVELOPMENT
- Microsoft Certified Solution Developer (Visual Basic, Visual C++)
- Database Administrators (Oracle, SQL Server)
- Web Based Development (Java or JavaScript, CORBA, Microsoft ASP, ActiveX, COM/DCOM)

Job opportunities are also available for Sale Managers, Marketing Managers, Business Managers, Human Resources Managers, Controllers and Technical Recruiters. Bachelor's or Master's degree required, depending on position. We also accept the foreign educational equivalent of the degree or the degree equivalent in education and experience. Excellent benefits. Send confidential resume and salary requirements to: CyberTech Systems,Inc. 1111 W. 22nd Street, 8th Floor, Oak Brook, IL 60523 OR 8 Neshaminy Interplex, Suite 209, Trevose, PA 19053.An equal opportunity employer.

Programmer Analyst. Sought by Des Plaines, IL consulting company to work in various unanticipated locations throughout the U.S. Plan, develop, test, code and document computer programs applying knowledge of programming techniques and computer systems. Evaluate user requests for new or modified results and design and develop software. Consult with user to identify current operating procedures and clarify program objects. Write program documentation to describe program development logic, coding and errors. Use of IBM ES/9000, DB2, CICS, COBOL, JCL, IMS, C++, Java, EASYTRIEVE, UNIX, SQL, XPEDITER and Window NT. Reqs. Bachelor's in Computer Science, Computer Engineering, Computer Information Systems, Electronic Engineering, Mathematics or its foreign equivalent. Plus 2 years in the job offered or 2 years in a related occupation including Systems Engineer and/or Software Engineer $72,000/year. 40 hrs/wk, 8:00AM-5:00PM. Applicants must show proof of legal authority to work in the US. Respond by resume to Illinois Department of Employment Security, 401 South State St - 7 North, Chicago, IL 60605. Attention: Bert Grunnet. Ref. # V-IL 24816-P "an employer paid ad". No calls - send 2 copies of both resume & cover letter.

Software Engineer sought by Comp Systems & Consulting Co in Glendora, CA to dsgn, dvlp, analyze, implmt C/S based comp systems. Must have MS in Electrical Engg or Comp Sci. Respond to CCC Information Services Inc. Attn: LaVon Jackson, HR Mgr, 2100 E. Alosta Ave., Glendora, CA 91740

Systems Analysts

Systems analysis, programming, design, and systems support using Oracle database and object-oriented programming. Must have knowledge of Oracle. Positions require a M.S. or B.S. degree in computer science. Must be authorized to work in the U.S. Send resume to Mark R. Federman, Professional Consulting Services, Inc., 1415 North Dayton, Suite 3S, Chicago, IL 60622-2610

IT Professionals

Entergy, one of America's largest utility companies, has multiple openings for the following occupations in multiple locations:

- Information Technology Professionals
- Systems Analysts
- Computer Programmers
- Software Engineers

For immediate consideration, please forward your resume and salary requirements to: Entergy Corporation and operating subsidiaries, Attn: Ms. Lori Handler, HR Department, PO Box 61000, New Orleans, LA 70161. Phone: 504-576-4117. EOE/M/F/D/V. Principals only. You will only be contacted if you are considered for an interview.

SYSTEMS ADMINISTRATOR/DEVELOPER

Administer computer system and Informix database. Involve in physical and functional design. Code database descriptions and specify identifiers of database to database management system. Design and implement physical database and informix applications using Visual Basic, Visual C++ and Informix 4 GL in client/server environment.

M.S. degree in Computer Science, 2 years of related experience in Visual C++ and Informix database design. Yearly salary: $45,000. 40 hrs/wk. Apply with the Oklahoma State Employment Service Office at 626 Kansas Ave., Chickasha 73018 (ID#2600).
Job Order# 441111

IT Co. seeks to fill the following positions in the Seattle, WA area:

i) Director Technical Alliances for the Americas – Support Chief Technical Officer re bus. devlpmnts affecting business strategy & open dialogue w/other companies. Work w/CTO to plot strategic direction and both define & articulate same to fellow employees. Identify potential industry partners, customers & potential competition. Meet w/other companies & articulate compan. strategy/strategic direction to potential partners. Represent company at industry conferences & seminars, either speaking about the company or for the purposes of research and networking with other companies. Reqs. BS in Computer Science or related field & 5 yrs exp in Enterprise Information Technology.

ii) Senior Object Technology Consultant – Provide advice on use of CORBA standard & company products to fulfill client needs. Consult w/clients re needs on projects & participate in software development lifecycle in the provision of solutions. Dvlp & deliver CORBA training courses/seminars to customers. Work w/clients in all phases of software dvlpmt including requirements analysis, design, implementation & test to ensure successful use of CORBA technology. Provide on-site & off-site technical consultancy to clients. Reqs BS in Comp Sc or related field w/2 yrs exp w/Object Oriented analysis, design & programming.

Send resumes to: Human Resources, Iona Technologies, Inc. 200 West Street, Waltham, MA 02451

Computer Analyst wanted for eyewear distributor in Beverly Hills, CA. Must have 4-5 years experience in operation and maintenance of optical distribution software, (OMNI), development and implementation of system enhancements, and systems testing. Respond to June Gray, Oliver Peoples, 8447 Wilshire Boulevard, Beverly Hills, CA 90211

DANIEL/COMPU-DATA, INC. is looking for Software Engineer for its office in San Francisco, CA. Position requires BS or foreign equiv in CS, Eng or related field & 2 yr exp researching, dsgng & dvlpg comp s/ware. Skills sought include C++ & HTML. Respond to HR Dept., DANIEL/COMPU-DATA, INC., 22 Third Street, San Francisco, CA 94103.
For more job opportunities see www.compudatainc.com

COMPUTER

I WebMD has job opportunities in the following locations: California (Santa Clara), Georgia (Atlanta), Minnesota (Plymouth), New York (Amherst), Ohio (Cleveland), Texas (Dallas), and in other areas across the United States:

Software Engineers (All Levels)
Project Leads
Programmer Analysts
Program Managers
Medical Editors
Database Architects
Development Managers
Sales Engineers

Please submit resume online at www.webmd.com/corporate/index.html, e-mail html-webmd@rpc.webhire.com; fax (408) 876-5300. When applying you must include appropriate position desired.

See our website for additional openings: www.webmd.com
EOE M/F/D/V

Business Development Manager, Colorado Springs, CO. 40 hrs/wk from 9:00 am to 6:00 pm; salary $61,800/yr. Identify business opportunities in telecommunications software development including data communications, customer care and billing, network management. Conduct systems studies for estimating time and cost; submit proposals; lead team in executing and delivering the product. Master's degree in Engineering (any field)/Computer Science. 2 yr exp in offd position. Must have proof of legal auth to work in the U.S. Send resume to: CO Dept of Labor & Employment, Employment Programs, ATTN: Jim Shimada, 2 Park Central, Ste 400, 1515 Arapahoe Street, Denver, CO 80202-2117. JO # CO4685167

Neotech Systems, Inc. La Palma, CA has multiple openings for experienced Project Managers, Software Engineers, Programmer/System Analysts and DBAs skilled in Oracle, Power Builder, Sybase, C++, Java, VB, AS 400, COBOL, HTML, IIS, ASP, MTS, Web technologies, Database administration, UNIX administration etc. BS/MS or equivalent required. Highly competitive salary, travel/relocation required. Send resumes to 6 Centerpointe Drive, Suite 630, Lapalma, CA 90623 or Email jobs@neotechsystems.com

◆

Multiple openings available for experienced Prog/Systems Analysts, DBAs and Software Engineers. Duties include but not limited to developing and designing s/w systems using various web/wireless technologies, OS, tools, software packages/languages, develop client server, mainframe, midrange, ERP and web applications. Require BS/MS or foreign equivalent. Highly competitive salaries, some travel and relocation involved. Send Resumes to: Opal Soft, Inc. 3150 Almaden Expwy Ste 105, San Jose, CA 95118

AirFlash, Inc. is looking for a Software Engineer for its Saratoga, CA office. Position requires MS or foreign equiv in CS, Eng or related field. Skills sought: C/C++, JAVA, and SQL. Respond to: HR Dept, AirFlash, Inc. 12900 Saratoga Avenue, Saratoga, CA 95070. For more job opportunities see www.Airflash.com

◆

Software Engineer: Software Re-Engineering, code optimization & migration. Developing, deploying/customizing web pages as per user interface requirement using netdynamics & iplanet application servers. Handling turnkey role of multi-language support web pages. Database, webserver, application server maintenance. Writing scripting interfaces to monitor network traffics required. Masters Degree or equivalent in Computer Science/Computer Engineering/I.T. or related. $65,000/year. 8:00-5:00. Send resume to Dept. of Workforce Services, Pat Redington, Job Order # 3061139, 140 E. 300 S., 5th Floor, SLC UT 84111

careers.com

SOFTWARE ENGINEER sought by software-oil & gas exploration co. in Houston, TX. B.S. in Comp. Sc. required. Send resume to VP/HS, Energy Graphics, Inc., 12121 Wickchester Lane, Ste 400, Houston, TX 77079

Design, develop, integrate client server on Multi-hardware/software environment for telecommunication industry. Analyze software to determine feasibility of design and evaluate interface between software and hardware. Tools used are, distributed RDM 4th GL, GUI, C, and JAVA. Req. MS in Comp Sci. & 2 yrs. exp. worksite: MO, FL. Send resume to Mithra Amaran, JMA-IT, 6405 Metcalf, #514, Overland Park, KS 66202

Software Engineer, Denver, CO- Research, design and develop computer software systems. System analysis, design, development and testing of Graphic User Interface (GUI)-based client/server applications using Object-Oriented Architecture (OOA), Object-Oriented Methodologies (OOM), Object-Oriented Programming (OOP) and Networking Sockets concepts. Master's degree or equiv. in Comp. Sci., MIS, Elec. Eng'g., Tech or rel. and one (1) year's exp. using GUI or Bachelor's degree or equiv. in Comp. Sci., MIS, Elec. Eng'g. or rel. and five (5) years' progressive exp. using OOM, OOP and C++. M-F, 9 to 5, 75K. Application by resume only to: Colorado Department of Labor and Employment, Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe Street, Denver, CO 80202-2117 and refer to order number: JL 1110822.

NEED TO HIRE.

START WITH US.

ITcareers and ITcareers.com reach more than 2/3 of all US IT workers every week. If you need to hire top talent, start by hiring us.

Call your ITcareers Sales Representative or Janis Crowley at 1-800-762-2977.

You can find a better JOB with one hand tied behind your back.

Just point your mouse to the world's best IT careers site.

Brought to you by Computerworld, InfoWorld and Network World.

Find out more.

Call your ITcareers Sales Representative or Janis Crowley, 1-800-762-2977

careers.com

Where the best get better

IT Careers in E-Business & E-Commerce

Watching the results of holiday e-tail giants is only part of the e-business story. Companies throughout the world are using e-business technologies to revamp their businesses, reducing borders and obstacles. In some instances, the web-enabled technologies are allowing regional businesses to flourish, while larger and more global firms are flocking to exchange operations that streamline the supply chain.

The net result for IT professionals is continued growth for those who understand effective business operations and how technology can resolve many of the fast-paced challenges.

Accenture
Chicago, IL

The name may be new, but Accenture has a long-standing reputation as one of the world's largest management and technology consulting organizations. Formerly Andersen Consulting, the group has five areas of operation – consulting, technology, outsourcing, alliances and venture capital services.

Bill Ziegler, global director of recruiting, says what this really means is that "Accenture is aspiring to be the market-maker, architect and builder of the new economy, bringing innovations to improve the way the world works and lives. For employees, that represents the best of both worlds. They can roll up their sleeves and do the kind of professional services work they want, while at the same tima have the career development, training and security a top firm that already enjoys an outstanding market reputation can offer."

Among the top attractions as an employer is that Accenture offers employees multiple experiences to apply their know-how with the world's top companias. "We need to hire approximately 20,000 people for our global organization," Zieglar says. Ziegler plans for approximately 40 percent of the hiring to be people with axperience, the remainder at entry level. "What we look for in tha people is a keen interest in what we do and who have the aptituda or experience to succeed. We define aptitude as a well-rounded person who has demonstrated strong communication skills, leadership and who has completed an internship or work program. Our interview process is designed to draw out whether the person is a life-long learner, committed to developing a career and who understands what we do. While e-commerce and e-business skills are important and we do hire computer science and engineering degrees, about 17 percent of our entry-level hires ara liberal arts graduates."

Accenture invested $650 million in employee training last year. "To keep Accenture ahead of the curve, we make investments in our people that allow us to create a client service capability that is at the market-maker level," Ziegler explains.

"The top three reasons you would join Accenture are clear," Ziegler says. "The first is that we offer a variety of opportunities with stability – a chance to work across a network of businesses. Second, this is a great place to work in terms of the programs we've been rolling out dedicated to our employees – continuous learning, leadership and flexible work arrangements. I only see this increasing in the future. Third, the competitive rewards, not just in the sense of money but also your personal and professional growth, are a priority for Accenture."

Ajilon LLC
Harrisburg, PA

Steve Dailey, vice president of Ajilon's Enterprise Solution Development National Practice, believes that agility is a basa requirement for businesses today, just as it is for the consultants who work at Ajilon. "To support our customers, we need folks who take hold of new technologies and business processes to build solutions," says Dailey. "The assumption when we hire experienced and energetic professionals is that they are strong with industry-specific business models and can integrate them into technology solutions."

Dailey's organization supports pure web-based development thet ranges from traditional e-business applications to supply chain integration and system transformation. "Our customers expect a combined effort, and we provide them with small, multi-disciplined teams of IT consultants. One of our strengths, that we've built over the past 34 years, is our ability to recruit the top IT talent around the world. This superior recruiting allows us to have a strong pipeline of experienced professionals worldwide.

"Another core competency for Ajilon is that we have performed numerous highly integrated projects over the past three decades. We're familiar with our clients' systems architecture and their business models," Dailey adds.

While Ajilon seeks professionals who are experienced, with business analysis skills, as well as technical skills in web development, architecture and systems development, and implementation, the company also focuses on skills that will be needed for the future. "Our internal tracking systems allow us to identify these skills. We have staff development boot camps that allow the staff to create and acquire new skills," Dailey explains. "We then share that new knowledge with our customers and their organizations."

Ajilon is involved with projects ranging from heavy, high-end initiatives through basic maintenance. "At base, we rely on a very entrepreneurial environment. Your creative talent is what helps us to continuously evaluate the business and marketplace. We try to connect the dots between your own drive and the marketplace. We're known for motivating, maintaining and retaining the high talent needed for our diverse projects."

Amazon
Seattle, WA

Coming off the holiday season, Amazon.com had good news – the online retailer sold more than 31 million items with 99 percent of the shipments arriving in time for the holidays. With a 29-million customer base, Amazon.com already is looking for new IT developments to maintain performance through tha 2001 season.

Robert Stohr, technical recruiting manager for Amazon.com, says the result is that the company continues hiring. "We never stop our search for the best talent," he says. The exact skills required shift constantly as the five-year-old mammoth continues to redefine the way online retail business is conducted. "Our biggest challenges continue to be scale and integration of merchandising, operations, distribution, and our retail stores," says Stohr. Amazon.com refers to its online links and offerings as stores, offering customers everything from the base of books to patio furniture, cookware, wireless phones, consumer electronics and more.

In 2000 the company's IT experts made it possible for every customer to have his or her own storefront, routing data and information to the customer based on browsing patterns, last item purchased or past buying trends. "The customer self-service tools that made this happen reflect tremendous IT challenges and a lot of hard work," Stohr explains. "We keep building on the experience, allowing customers to track the order through shipment and delivery. Our goal is to make the online experience more and more personal, better then what you would get at a traditional store. Our ultimate win is the best possible shopping experience for the customer."

Stohr says there is a need for talented software development engineers. "We want people with technical skills but also who

IT Careers in E-Business & E-Commerce

have experience working with scalability issues. We also want people who have the core competencies that define what Amazon is," says Stohr. "These include being biased for action, individuals who are innovative in their thinking and who can figure out how to get things done."

Stohr believes the Amazon.com challenge is unparalleled. "What you are doing will be completely new. We are entrepreneurs working together. That means we operate in a highly individual environment that fosters creativity but that relies on teams to accomplish things," he says. "This is a high performance environment that requires people to stretch and grow. It's extremely individual and collaborative at the same time, and that combination is appealing to most people. Amazon.com provides its employees with a workplace that has some of the best and brightest in this industry, people who are eager to work with one another. Finally, there are myriad opportunities at Amazon.com. Employees are given the opportunity to work in different functions of the business, create applications that have never existed before and see them at work in the marketplace in just a few months."

Bloomberg
New York, NY

Most people think of news and information dissemination when they think of Bloomberg. However, the media giant is a major player in the IT world with constant challenges in developing proprietary information tools. "Within the IT world, we would be described as a service provider," explains Wellington Wonsang, recruiting manager for research and development. "The bulk of our business comes not from publishing or news but from leasing and selling of licenses for our hardware and software."

The company delivers information from a variety of sectors, from consumer goods and retail to current R&D initiatives. "We provide information to businesses so they can conduct their business more effectively and efficiently," he says. "The difference is that our primary focus is not selling products online, we're delivering data."

Wonsang says the projects provide a two-fold challenge: dealing with highly proprietary information and creating technical solutions from the ground up. "We aren't working with the traditional object-oriented technologies," he explains. "The majority of our development efforts are in the C/UNIX environment. This is done strategically not as aversion to object-oriented technologies but because C is a compiler language, allowing us to take raw code and develop unique applications, functionalities and features from the ground up."

Wonsang says the technical challenges are coupled with an open environment that stresses the exchange of information and ideas between colleagues. "Mike Bloomberg doesn't even have an office," he says of the company's owner. "Our conference rooms have glass walls – the overall idea is that this is an open environment. The contrast between this open culture and the highly proprietary nature of our work makes for two extremes that blend into one great environment."

While the open environment fosters learning from one another, the company also invests in Bloomberg University to provide training on technical and business skills for employees. The ACD Line is an automated call distribution system that allows employees to phone in with requests for specific expertise. After one year of employment, individuals are encouraged to transfer to other areas of Bloomberg. "Because the systems are so proprietary, we look at this as a way to transfer knowledge, making you even more valuable as an employee.

"We are looking for application development people who are solid code warriors, who are interested in C language and working in the UNIX/Solaris environment," says Wonsang. "Experience with financial functions is helpful as we have teams supporting fixed income analysis, equity and trade book. This doesn't mean we don't recognize and hire talent from other industries, such as telecommunications and pharmaceuticals. We also have a robust college recruitment program in which we look for people with a good, solid undergraduate degree – not necessarily a technical degree but evidence for the capacity to learn. Even through we look for graduating students with a technical focus, we also look for students with the capacity to learn the technology."

The Revere Group
Deerfield, IL

In a world of coding, the Revere Group refers to itself as a "heavy-lifting integrator." Susan Fuller, vice president of internal operations for the business, says the firm is known as a trusted advisor to middle-market businesses. "We're known for providing competence and results, as well as a strong methodology for our projects. For instance, when you go to retail row, you choose a store owned by someone who pays attention to detail and you know the quality of the product you get. That's us in the e-business consulting world. We're built on repeat business."

While the Revere Group doesn't target the Fortune 100, the firm has been part of some major projects. For the National Transportation Exchange, the Revere Group developed an integrated commerce exchange, like the NASDAQ, for sharing information between transportation supply chain members in rail and trucking. "We helped architect the consolidation of exchange applications under a single web umbrella," says Fuller. The project involved a diverse team that provided technical and functional skills, as well as subject-matter expertise.

The company provided Distribution Market Advantage, a national food service distribution company, with a web presence to support their member constituency that included a web-based order entry and reporting system servicing DMA's members and customer commerce needs. The company also helped streamline the business process for PeaPod, a Chicago metro-area online grocer who switched from use of neighborhood grocers as suppliers to its own warehouse distribution system. "We helped consolidate and scale this system to meet the demand. We were involved with identifying and evaluating a variety of warehouse management systems, as well as selection and integration into an end-to-end collaborative commerce engine," Fuller says.

These types of projects are driving hiring for the coming year. "We don't limit ourselves to job requisitions," Fuller says. "Instead we maintain an ongoing search for individuals with technical skills who can meet the demand for leading-edge technologies, whatever those may be at the current time. We look for people who have technical breadth and depth in a variety of areas."

UUNET
Ashburn, VA

Just over a decade ago, UUNET was formed as one of the original Internet companies. Today the company has more than 70,000 business customers on five continents. Janet Brumfield, spokesperson for the company, says Internet Provider services are available in more than 100 countries. "We offer a range of Internet services for businesses, ranging from Internet access to web hosting and remote access to virtual private networking and security," she says.

Currently the company has 7,000 employees around the world, with major offices in Ashburn, Columbus (OH), Ann Arbor (MI) and London.

"We have numerous positions open in information technology," says Brumfield. UUNET is hiring product engineers, network engineers, web developers, network monitoring and support personnel, marketing/engineering support, planning and provisioning engineers and sales and marketing professionals. "We seek people with a technical background, particularly who have experience in the IP market."

Among the 2001 challenges is continued expansion of the UUNET global network and enhancements to the services offered. Site-to-site VPN solutions currently are offered in 23 countries, but UUNET plans to expand to new countries throughout the year. "We also offer challenges in wireless/Internet technology, voice over IP and other leading-edge technologies," Brumfield says.

"In addition to the technical challenges and worldwide nature of our business, UUNET has a lot to offer," Brumfield adds. "All the toys are here, from our test bed and labs to the latest in equipment. We are traveling uncharted waters so some of the things that you will be doing with UUNET has never been done before."

ITcareers

For more job opportunities with E-Business & E-Commerce firms, turn to the pages of ITcareers.

- **If you'd like to take part in an upcoming ITcareers feature, contact Janis Crowley, 650.312.0607 or janis_crowley@itcareers.net.**
- **Produced by Carole R. Hedden**
- **Designed by Alderman Graphic Solutions**
- **Images: www.comstock.com**

AD INDEX

SALES OFFICES

Computerworld Headquarters:
500 Old Connecticut Path, PO Box 9171, Framingham, MA 01701-9171
Phone: (508) 879-0700, Fax: (508) 875-4394

President & CEO
Alan R. Guibord

Senior Vice President/Associate Publisher
Sherry Driscoll-Coleman

Vice President/Customer Solutions
Elaine R. Offenbach

Vice President/Key Accounts
Linda Holbrook

NORTHEAST

ACCOUNT DIRECTORS: Laurie Marinone, Paul Reiss **SALES OPERATIONS MANAGER:** Leslie Murray **FIELD MARKETING ASSOCIATE:** Samantha Monette **SALES ASSOCIATE:** Deborah Crimmings, 500 Old Connecticut Path, Framingham, MA 01701 (508) 879-0700 Fax (508) 270-3882

SOUTHEAST

ACCOUNT DIRECTOR: Lisa Ladle Wallace, 5242 River Park Villas Dr., St. Augustine, FL 32092 (800) 779-5622 Fax (800) 779-8622 **SALES ASSOCIATE:** Peter Coen, 500 Old Connecticut Path, Framingham, MA 01701 (508) 879-0700 Fax (508) 270-3882

METRO NEW YORK

ACCOUNT DIRECTORS: Fred LoSapio, John Bosso **FIELD MARKETING EXECUTIVE:** Maureen Grady **FIELD MARKETING ASSOCIATE:** John Radzniak **SALES & OFFICE ASSOCIATE:** Susan Kusnic, Mack Cali IV, 61 South Paramus Rd., 3rd Floor, Paramus, NJ 07652 (201) 587-0090 Fax (201) 587-9255, (201) 587-1289

NORTHWEST

ACCOUNT DIRECTORS: John Canavan, Kevin Ebmeyer **SALES ASSOCIATE:** Camilla Dissing, 177 Bovet Road, Suite 400, San Mateo, CA 94402 (650) 357-0200 Fax (650) 524-7000 **FIELD MARKETING EXECUTIVE:** Jill Colley, 10900 N.E. 8th Street, Suite 820, Bellevue, WA 98004 (425) 451-0293 Fax (425) 451-3822

NORTHERN CENTRAL STATES

REGIONAL VICE PRESIDENT: Blayne Long **FIELD MARKETING EXECUTIVE:** Janet Anderson **SALES ASSOCIATE:** Cathy Viox, 1011 East Touhy Avenue, Suite 550, Des Plaines, IL 60018 (847) 827-4433, Fax (847) 827-0690

SOUTHERN CENTRAL STATES

ACCOUNT DIRECTOR: Tom Buckley **FIELD MARKETING EXECUTIVE:** Janet Anderson **SALES ASSOCIATE:** Cathy Viox, 1011 East Touhy Avenue, Suite 550, Des Plaines, IL 60018 (847) 827-4433, Fax (847) 827-0690

BAY AREA

VICE PRESIDENT/KEY ACCOUNTS: Linda Holbrook **ACCOUNT DIRECTORS:** Kevin Ebmeyer, Kelly Mahoney, Debbie Sorich, Michelle Yates **SALES OPERATIONS MANAGER:** Emmie Hung **FIELD MARKETING ASSOCIATE:** Chris Kallin **SALES ASSOCIATE:** Amital Ermias, 177 Bovet Road, Suite 400, San Mateo, CA 94402 (650) 357-0200 Fax (650) 524-7000

SOUTHWEST

ACCOUNT DIRECTOR: Michelle Yates **FIELD MARKETING EXECUTIVE:** Navid Davani **SENIOR SALES ASSOCIATE:** Jean Dellarobba, 18831 Von Karman Avenue, Suite 200, Irvine, CA 92612 (949) 250-3942 Fax (949) 476-8724

COMPUTERWORLD

PRODUCTION: Production Manager/Beverly Wolff **PRINT DISPLAY ADVERTISING:** Toula Karayan (508) 620-7747 Fax (508) 879-0446 **DISTRIBUTION:** Distribution Manager/ Bob Wescott **AUDIENCE AND MARKET RESEARCH:** Director/Joanne Oteri; Research Analysts/Seanna Maguire, Candace O'Keefe

ENTERPRISE BUSINESS SOLUTIONS

BOSTON: Director Strategic Initiatives/Leo Leger; Sales Operations Manager/Maria McGrath; Event Operations Manager/Faith Pasternak; Event Program Manager/Michael Melody; Conference Manager/Ann-Marie Trebendis; Senior Graphics Production Coordinator/Heidi Broadley; Editor/Stefanie McCann; Event Program Coordinator/Whitney Lynch, 500 Old Connecticut Path, Box 9171, Framingham, MA 01701-9171 (508) 879-0700 Fax (508) 875-6310

ONLINE ADVERTISING

Sales Manager/Gregg Pinsky (508) 271-8013; Account Executive/Matt Duffy (508) 820-8145; Sales Operations Manager/Maureen Roberti (508) 271-8007, 500 Old Connecticut Path, Box 9171, Framingham, MA 01701-9171 Fax (508) 875-6310

IT CAREERS ADVERTISING SALES OFFICES

Vice President-General Manager/Janis Crowley; Marketing Director/ Kelli Flanagan; Marketing Specialist/Heidi Tanakatsubo; Marketing Coordinator/Claudia Tsunoda; Operations Manager/Donna Kent; Advertising Coordinators/Leilani Lopez, Carla Amaral, 155 Bovet Road, Suite 101, San Mateo, CA 94402 (800) 762-2977 Fax (650) 286-2770 **EAST:** Regional Manager/Deanne Holzer (212) 828-6891; Account Manager/Chantelle Finney; Sales Associate/Tina Silveira, 155 Bovet Road, Suite 101, San Mateo, CA 94402, (800) 762-2977 Fax (650) 286-2770 **MIDWEST:** Regional Manager/Laura Wilkinson, (773) 248-4301; Senior Account Manager/Donna Dugan (312) 587-1390 Fax (650) 312-0542; Sales Associate/Nikki Wilson, 155 Bovet Road, Suite 101, San Mateo, CA 94402 (800) 762-2977 Fax (650) 286-2770 **WEST:** Account Manager/Whitney Nagy; Sales Associate/Lisa Olivas, 155 Bovet Road, Suite 101, San Mateo, CA 94402, (800) 762-2977 Fax (650) 286-2770

LIST RENTAL - POSTAL: Rich Green, (508) 370-0832, e-mail: rich_green@idg.com. **LIST RENTAL - E-MAIL:** Christine Cahill (508) 370-0808, e-mail: christine_cahill@idg.com. **MAILING ADDRESS:** IDG List Services, P.O. Box 9151, Framingham, MA 01701-9151, FAX: (508) 370-0020

COMPUTERWORLD

President & CEO
Alan R. Guibord

Chief of Staff
Laureen Austermann
(508) 820-8522

Vice President/CIO
Rick Broughton
(508) 620-7700

Vice President/COO
Robert DaSilva
(508) 271-7114

Vice President/Marketing
Derek Hulitzky
(508) 620-7705

Vice President/Editor in Chief
Maryfran Johnson
(508) 620-7724

Vice President/ Manufacturing Operations
Carolyn Medeiros
(508) 620-7733

Vice President/General Manager Enterprise Business Solutions
Ronald L. Milton
(508) 820-8661

Vice President/ Strategic Circulation Operations
Eric Schmierer
(508) 820-8217

Executive Vice President
Matthew C. Smith
(508) 820-8102

INTERNATIONAL DATA GROUP

CHAIRMAN OF THE BOARD, *Patrick J. McGovern*   **PRESIDENT/CEO,** *Kelly Conlin*

IDG

Computerworld is a publication of International Data Group, which informs more people worldwide about information technology than any other company in the world. With annual revenues of $2.35 billion, IDG is the leading global provider of IT media, research, conferences and expositions. IDG publishes more than 290 computer newspapers and magazines and 700 book titles in 75 countries, led by Computerworld/Infoworld, Macworld, Network World, PC World, Channel World and the "...For Dummies" global product lines. IDG offers online users the largest network of technology sites around the world through IDG.net (http://www.idg.net), which comprises more than 225 targeted web sites in 55 countries. IDG is also a leading producer of 168 computer-related expositions in 35 countries, and its research arm, International Data Corporation (IDC) provides global IT industry research and analysis through 49 offices in 41 countries worldwide. Company information is available at http://www.idg.com

ADVERTISERS INDEX

HAVE A PROBLEM WITH YOUR COMPUTERWORLD SUBSCRIPTION?

We want to solve it to your complete satisfaction, and we want to do it fast. Please write to:

Computerworld, P.O. Box 512, Mt. Morris, IL 61054-0512.

Your magazine subscription label is a valuable source of information for you and us. You can help us by attaching your magazine label here, or copy your name, address, and coded line as it appears on your label. Send this along with your correspondence.

Address Changes or Other Changes to Your Subscription

All address changes, title changes, etc. should be accompanied by your address label, if possible, or by a copy of the information which appears on the label, including the coded line.

Your New Address Goes Here: **Address shown:** ☐ Home ☐ Business

NAME
COMPANY
ADDRESS
CITY   STATE   ZIP

ZIP
STATE
COMPANY
NAME
TITLE
ADDRESS
CITY

Other Questions and Problems

It is better to write us concerning your problem and include the magazine label. Also, address changes are handled more efficiently by mail. However, should you need to reach us quickly the following toll-free number is available: **1-800-552-4431**

Outside U.S. call (740) 382-3322. Internet address: circulation@computerworld.com

How to Contact Computerworld

TELEPHONE/FAX

Main phone number (508) 879-0700
All editors unless otherwise noted below
Main fax number (508) 875-8931
24-hour news tip line (508) 820-8555

E-MAIL

Our Web address is **www.computerworld.com**. All staff members can be reached via e-mail using the form: **firstname_lastname@computerworld.com**.

All IDG News Service correspondents can be reached using the form: **firstname_lastname@idg.com**.

LETTERS TO THE EDITOR

Letters to the editor are welcome and should be sent to: **letters@computerworld.com**. *Include your address and telephone number.*

MAIL ADDRESS

PO Box 9171, 500 Old Connecticut Path,
Framingham, Mass. 01701

SUBSCRIPTIONS/BACK ISSUES

Subscription rates: U.S., $58/year; Canada, $110/year; Central and South America, $250/year; all others, $295/year

Phone (800) 552-4431
E-mail circulation@computerworld.com
Back Issues (508) 820-8167

REPRINTS/PERMISSIONS

Phone Ray Trynovich (717) 399-1900, ext. 124
E-mail rtry@rmsreprints.com

CONTACTING CW EDITORS

We invite readers to call or write with their comments and ideas. It is best to submit ideas to one of the department editors and the appropriate beat reporter.

Editor in Chief Maryfran Johnson (508) 820-8179
Editorial Director, Print/Online Patricia Keefe (508) 820-8183

DEPARTMENT EDITORS

News Editor Anne McCrory (508) 820-8205
Features Editor Kevin Fogarty (508) 820-8246
Assistant News Editor Don Tennant (508) 620-7714
Assistant Business Editor Melissa Solomon (508) 620-7754
Assistant Technology Editor Tommy Peterson (508) 620-7729
Washington Bureau Chief Mitch Betts (202) 347-6718
West Coast Bureau Chief Pimm Fox (650) 524-7116
West Coast Editor Mark Hall (503) 391-1158

REPORTERS

Mobile computing/wireless Bob Brewin (301) 277-8069
Internetworking, telecom/wireless, defense and aerospace James Cope (219) 273-5369
Application development, Java, automotive Lee Copeland (773) 394-0402
Careers, labor issues, outsourcing, application service providers, health care Julekha Dash (804) 295-9512
General assignment, e-mail, groupware Jennifer DiSabatino (508) 820-8122
Network, systems management, food, retail and restaurant Sami Lais (301) 270-1427
General assignment, travel Michael Meehan (508) 820-7704
General assignment, storage Lucas Mearian (508) 820-8215
Microsoft operating systems and BackOffice, retailers Carol Sliwa (508) 628-4731
Enterprise resource planning, customer relationship management and supply-chain software; Novell Marc L. Songini (508) 820-8182
General assignment, Intel servers, transportation/carriers Linda Rosencrance (508) 628-4734
State/federal government, antitrust, legal issues, politics Patrick Thibodeau (202) 333-2448
IT management, financial services Maria Trombly (413) 323-0842
B2C e-commerce and technologies, databases, data mining, Web infrastructure Dan Verton (703) 321-2277
Large systems/high-end Web server technology, security, heavy manufacturing Jaikumar Vijayan (508) 820-8220
General assignment, Linux and Unix operating systems Todd Weiss (717) 560-5255

OPINIONS

Senior News Columnist Frank Hayes (503) 252-0100
Columns Editor Rick Saia (508) 820-8118

FEATURE EDITORS

Special Projects Editor Ellen Fanning (508) 820-8204
Business Features Editor Thomas Hoffman (845) 988-9630
Reviews Russell Kay (508) 820-8175
Special Projects Editor Julia King (610) 532-7599
Technology Evaluations Editor Robert L. Mitchell (508) 820-8177
IT Management Rick Saia (508) 820-8118
IT Careers David B. Weldon (508) 820-8166

FEATURE WRITERS

Gary H. Anthes (202) 347-0134;
Matt Hamblen (508) 820-8567;
Kathleen Melymuka (508) 628-4931;
Kim S. Nash (773) 275-4133;
Mathew Schwartz (508) 820-8285;
Deborah Radcliff (707) 829-5823

RESEARCH

Mari Keefe, **research manager**;
Allison Wright, **research associate**;
Gussie Wilson, **research assistant**;
Jennifer McBride, **research intern**

COPY DESK

Jamie Eckle, **managing editor/production** (508) 820-8202;
Jean Consilvio, **assistant managing editor/production**;
Michele Lee, Bob Rawson, **senior copy editors**;
Jacqueline Day, Eugene Demaitre,
Linda Frank, Mike Parent, **copy editors**

GRAPHIC DESIGN

Stephanie Faucher, **design director**, (508) 820-8235;
Mitchell J. Hayes, **art director**; April O'Connor, **associate art director**;
Julie D'Errico, Michael Knapp, **graphic designers**;
Rich Tennant, John Klossner, **cartoonists**

ADMINISTRATIVE SUPPORT

Linda Gorgone, **office manager** (ext. 8176);
Connie Brown (ext. 8178); Lorraine Witzell (ext. 8139)

COMPUTERWORLD ONLINE

Tom Monahan, **director, online and design** (508) 820-8218; Sharon Machlis, **managing editor/online** (508) 820-8231; Craig Stedman, **online news editor** (508) 820-8120; Marian Prokop, **online news editor** (508) 620-7717; Vanessa DiMauro, **communities director** (508) 820-8110; Brian Sullivan, **communities page editor** (508) 620-7780; John R. Brillon, David Waugh, **associate art directors**; Peter Smith, **Web development manager**; David Ramel, **online production coordinator and e-mail newsletter editor**; William Rigby, **online services manager**; Paul Krasnoe, Matthew Moring, **graphic designers**

CONTRIBUTING COLUMNISTS

Allan E. Alter, Joe Auer, Jim Champy, John Gantz, Dan Gillmor, Peter G. W. Keen, Bill Laberis, David Moschella, Fran Quittel, Paul A. Strassmann, Don Tapscott, Ed Yourdon

CONTRIBUTING WRITERS

Leslie Goff, Amy Helen Johnson

COMPANIES IN THIS ISSUE

Page number refers to page on which story begins. Company names can also be searched at
www.computerworld.com

3COM CORP	70
A.G. EDWARDS & SONS INC	60
ABERDEEN GROUP INC	10
ABN AMRO HOLDING NV	10 60
ACCUCASE LLC	60
ADVANCED INTERNET RECRUITING STRATEGIES	60 51
AEC SOFTWARE	58
AELTUS INVESTMENT MANAGEMENT INC	58
ALCATEL	10
ALLAIRE CORP	8
ALTAVISTA CO	10
AMAZON.COM INC	17 60
AMERICA ONLINE INC	6 10
AMERICAN BANKERS ASSOCIATION	7
AMERICAN BUSINESS FINANCIAL SERVICES INC	60
AMERICAN CANCER SOCIETY INC	53
AMERICAN CIVIL LIBERTIES UNION	6
AMERICAN ELECTRONICS ASSOCIATION	7
AMERICAN IMMIGRATION LAWYERS ASSOCIATION	60
AMERICAN LIBRARY ASSOCIATION	7
AMERICAN AIRLINES INC	12
AMR CORP	12
AMR RESEARCH INC	6 12 58
ANSWERTHINK INC	60
AOL TIME WARNER INC	1 6
APPLE COMPUTER INC	14 58 60
AT&T CORP	60
AVENTIS PHARMACEUTICALS INC	60
AVENDA TECHNOLOGIES INC	60
BALTIMORE TECHNOLOGIES PLC	60
BAYERISCHE MOTOREN WERKE AG	6
BEA SYSTEMS INC	8 58
[illegible] COMPONENTS LTD	60
BIOGEN INC	70
BLACKSTONE TECHNOLOGY GROUP	60
BMC SOFTWARE INC	60
BONSBOOK LLC	60
BP AMOCO PLC	14
BURLINGTON NORTHERN SANTA FE RAILWAY CORP	60
CABLE & WIRELESS PLC	10
CABLE NEWS NETWORK	17
CALDERA SYSTEMS INC	60
CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORP	32 44
CAMBRIDGE INCUBATOR	41
CAMBRIDGE TECHNOLOGY PARTNERS INC	29
CAREERROADS	60
CASE LOGIC INC	60
CASIO COMPUTER CO	60
CELERA GENOMICS GROUP	6 70
CERTAINTY SOLUTIONS INC	14
CHALLENGER, GRAY & CHRISTMAS INC	1 60
CINERGY CORP	14
CISCO SYSTEMS INC	46 50 10
CITADEL INVESTMENT GROUP LLC	10
COMPAQ COMPUTER CORP	8 20 29 68 70
COMPUSERVE CORP	6
COMPUTER ASSOCIATES INTERNATIONAL INC	60
COMPUTER SCIENCES CORP	10
COMPUTER SECURITY INSTITUTE	44
COMPUTER SYSTEMS AUTHORITY	6
CONSUMER FEDERATION OF AMERICA	62
CONTINENTAL AIRLINES INC	12
COVISINT LLC	12
CRITICAL INFRASTRUCTURE ASSURANCE OFFICE	44
CURRENT ANALYSIS INC	14 70
CUTTER CONSORTIUM	10
DAIMLERCHRYSLER AG	10
DAIRY.COM	60
DANA CORP	12
DB CAPITAL PARTNERS INC	28
DEFENSE FINANCE AND ACCOUNTING SERVICE	68
DEFENSE INFORMATION SYSTEMS AGENCY	30
DEFENSE LOGISTICS AGENCY	30
DELL COMPUTER CORP	7 24 60
DELTA AIR LINES INC	12
DIGEX INC	30
DOFASCO INC	12
DVS ANALYTICS INC	10
EATON CORP	6
EBAY INC	7 68
EDS CORP	60
ELECTRONIC PRIVACY INFORMATION CENTER	7
E LOAN INC	60
EMC CORP	16 29 68 70
ENTERPRISE MANAGEMENT ASSOCIATES INC	56
E-STEEL.COM	10
ETOWN.COM	1
ETRADE GROUP INC	56
EXODUS COMMUNICATIONS INC	14
EXPEDIA INC	12
EXTENDED SYSTEMS INC	52
EXXON MOBIL CORP	10 44
FANNIE MAE	60
FBI	7 44 58 60
FEDERAL TRADE COMMISSION	58
FEDEX CORP	8 58
FIDELITY INVESTMENTS	44
FILAMENT COMMUNICATIONS INC	6
FIRST UNION CORP	68
FLAG TELECOM HOLDINGS LTD	10
FORD MOTOR CO	12
FREDDIE MAC	20
FREIGHTWISE INC	40
GARTNER GROUP INC	6 12 20 68 10 62
GATEWAY INC	14 29
GENERAL MOTORS CORP	8 12
GETTHERE INC	10
GIGA INFORMATION GROUP INC	14
GOMEZ ADVISORS INC	12 40
GOOGLE INC	51
GOTO.COM INC	71
GST TELECOMMUNICATIONS INC	6
HENKEL KGAA	10
HERSHMAN RECYCLING INC	40
HEWITT ASSOCIATES LLC	10
HEWLETT-PACKARD CO	16 29 68 10
HIGHGROUND SYSTEMS INC	68
HUSKY COMPUTERS LTD	6
IBM	1 6 10 16 25 58 60 68 10
IDC	20 33
ILLUMINATA INC	68
IMATION CORP	60
IMMIGRATION AND NATURALIZATION SERVICE	30
INC2INC TECHNOLOGIES CORP	20
INFORMATION TECHNOLOGY ASSOCIATION OF AMERICA	44
INPRISE CORP	58
INSTINET CORP	60
INSTITUTE OF INTERNAL AUDITORS INC	44
INTEL CORP	10 16 25 28 29 68 70
INTERNATIONAL CENTER FOR ADVANCED INTERNET RESEARCH	6
INTERNATIONAL DATA GROUP	1
INTERNATIONAL Y2K COOPERATION CENTER	32
INTERNET CORPORATION FOR ASSIGNED NAMES AND NUMBERS	6 36
INTERNET PICTURES CORP	1
INTERNET SECURITY SYSTEMS INC	16
INVESTCORP	20
IOMEGA CORP	60
IT INFORMATION SHARING AND ANALYSIS CENTER	10
J.P. MORGAN CHASE & CO	10
JOHNSON CONTROLS INC	12
JOINT TASK FORCE FOR COMPUTER NETWORK DEFENSE	68
JUNKBUSTERS CORP	7
JUPITER RESEARCH	6 58
KAISER PERMANENTE HEALTH PLAN INC	60
KENNEDY INFORMATION RESEARCH GROUP	30
KEYNOTE SYSTEMS INC	10
KRAFT FOODS INC	20
LAND O'LAKES INC	60
LEGATO SYSTEMS INC	68
LENDINGTREE INC	30
LERNOUT & HAUSPIE SPEECH PRODUCTS NV	29
LIAONING TELECOM	1
LIFEFX INC	10
LINUX NETWORX INC	70
LOANSDIRECT INC	60
LOANZ.COM	60
LOCKHEED MARTIN CORP	10
LOGICON INC	60
LOGIREEP INC	17
LOS ALAMOS NATIONAL LABORATORY	7
LOTUS DEVELOPMENT CORP	10
LUCENT TECHNOLOGIES INC	18
MACROMEDIA INC	8
MARATHON NATIONAL BANK	7
MASCON GLOBAL LTD	62
MASTERCARD INTERNATIONAL INC	62
MATRIX RESOURCES INC	28
MATRIXONE INC	10
MERIDIEN RESEARCH INC	7
MERRILL LYNCH & CO	20
METAWARE INC	68
MICROSOFT CORP	1 6 7 8 10 18 24 44 50 58 60 62 68 70 81
MOLEHILL VENTURES	62
MOMENTX CORP	28
MORTGAGE BANKERS ASSOCIATION OF AMERICA	20
MOTOROLA INC	8 29 60
MTV NETWORKS	62
MYRICOM INC	26
NASA	68
NASDAQ STOCK MARKET INC	60
NATIONAL CENTER FOR SUPERCOMPUTING APPLICATIONS	26
NATIONAL PARTNERSHIP FOR CRITICAL INFRASTRUCTURE PROTECTION	10
NATIONAL SECURITY AGENCY	45 48
NATIONAL SECURITY COUNCIL	10
NATIONAL SECURITY TELECOMMUNICATIONS ADVISORY COMMITTEE	44
NAVISITE INC	58
NBC INTERNET INC	14
NEC ELECTRONICS INC	70
NEC TECHNOLOGIES INC	70
NETIQ CORP	68
NETSCAPE COMMUNICATIONS CORP	10
NEW RANGE LTD	8
NEW YORK STOCK EXCHANGE INC	60
NEW YORK-PRESBYTERIAN HEALTHCARE SYSTEM	58
NEW YORK-PRESBYTERIAN HOSPITAL	58
NIKKO-ENERGY TECHNOLOGY CORP	60
NOVA CORP	10
NORTH AMERICAN ENERGY RELIABILITY COUNCIL	44
NORTHERN CALIFORNIA MEDIA WORKERS GUILD	1
NORTHPOINT COMMUNICATIONS GROUP INC	69
NORTHROP GRUMMAN CORP	68
NORTHWEST AIRLINES CORP	10
NUANCE COMMUNICATIONS INC	6
OBSIDIAN STUDIOS INC	6
OFFICE OF PRESIDENTIAL LIBRARIES	14
ONLOAN.COM	20
ORACLE APPLICATIONS USER GROUP	6
ORACLE CORP	6 51
ORBITZ LLC	10
PACIFIC GAS & ELECTRIC CO.	10 32 44
PALM INC	6
PEOPLE'S BANK	68
PEROT SYSTEMS CORP	69
PHOCUSWRIGHT INC	12
PLATFORM COMPUTING CORP	60
PRICELINE.COM INC	1
PURDUE UNIVERSITY	30 68
REALNETWORKS INC	58
RECRUITERS DREAMNETWORK	60
RED HAT INC	7 10 29
RISE INTERNET RECRUITING SEMINARS	50
ROYAL DUTCH/SHELL GROUP	25
ROYAL PHILIPS ELECTRONICS NV	10
SABRE INC	12
SANDIA NATIONAL LABORATORIES	6
SANS INSTITUTE	44
SAS INSTITUTE	60
SEAGATE TECHNOLOGY INC	68
SECURITIES AND EXCHANGE COMMISSION	60
SEMTOR INC	29
SIEBEL SYSTEMS INC	53
SILICON GRAPHICS INC	68 70
SKYTEL COMMUNICATIONS INC	60
SONY CORP	68
SOUTHERN CALIFORNIA EDISON CORP	32 44
SRA INTERNATIONAL INC	10
STORAGE DIMENSIONS INC	68
STORAGE NETWORKING INDUSTRY ASSOCIATION	68
STRATECAST PARTNERS	10
STRATUS TECHNOLOGIES	28
SUIZA FOODS CORP	60
SUMMIT STRATEGIES INC	35
SUN MICROSYSTEMS INC	8 10 16 20 58 68 70
TACTICAL STRATEGY GROUP INC	30
TECHNET	14
TECHNOLOGY BUSINESS RESEARCH INC	10 38
TEXAS DEPARTMENT OF INFORMATION RESOURCES	1
THE CHASE MANHATTAN CORP	14
THE GILLETTE CO	14
THE MTVI GROUP INC	62
TIME WARNER TELECOM INC	6
TIMEX CORP	60
TIVOLI SYSTEMS INC	68
TRANSPLACE.COM	60
TRAVELOCITY.COM INC	12
TRIPWIRE INC	58
TRITON TRANSPORT SERVICES INC	60
TURBOLINUX INC	20
U.S. AIR FORCE	44 58 68
U.S. ARMY	68
U.S. DEPARTMENT OF AGRICULTURE	1
U.S. DEPARTMENT OF COMMERCE	1 6 10
U.S. DEPARTMENT OF ENERGY	6 68
U.S. DEPARTMENT OF LABOR	60
U.S. DEPARTMENT OF TRANSPORTATION	1
U.S. GENERAL ACCOUNTING OFFICE	7
U.S. MARINES	68
U.S. NAVY	1 48
U.S. SPACE COMMAND	68
UNISYS CORP	24 68
UNITED AIR LINES INC	12
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN	25 68
UNIX INTERNATIONAL	68 70 82
UPLAND MORTGAGE	20
UPMC HEALTH SYSTEM	68
USINTERNETWORKING INC	53
VENCOR INC	68
VERITAS SOFTWARE CORP	68 70
VERIZON COMMUNICATIONS	70
VERTEX PHARMACEUTICALS INC	62
VINSON & ELKINS LLP	1
VOTING INTEGRITY PROJECT	24
WALKER DIGITAL	1
WASHINGTON ALLIANCE OF TECHNOLOGY WORKERS	1
WINCOR NIXDORF LLC	30
XPEDIOR INC	71
YAHOO INC	7 68 51
ZENSYS USA INC	60
ZERENNER & ASSOCIATES INC	68
ZONA RESEARCH INC	14

Tech Vendors, Feds Join to Share Security Information

Cisco, CSC, Microsoft, HP and Oracle are among the founders of IT alliance

BY DAN VERTON

A GROUP OF 19 technology vendors last week took a long-awaited step aimed at improving data security procedures by announcing the formation of an alliance aimed at sharing information about viruses and other potential threats to corporate and government computer networks.

Plans for the IT Information Sharing and Analysis Center (IT-ISAC) were detailed at the U.S. Department of Commerce in Washington by government officials and representatives from participating vendors such as Cisco Systems Inc., Computer Sciences Corp. (CSC), IBM, Hewlett-Packard Co., Microsoft Corp. and Oracle Corp.

Their goal is to set up a secure mechanism for companies to exchange information about security vulnerabilities with one another and with government agencies.

Internet Security Systems Inc., an Atlanta-based vendor of security management software, will operate the new virtual data-sharing center under the oversight of a board of directors drawn from many of the founding companies. Other companies will be able to join the IT-ISAC initiative for $5,000 per year.

Outgoing Commerce Secretary Norman Mineta said sharing information about oetwork intrusions, security vulnerabilities and measures that companies can take to protect their systems is one of the best ways to safeguard IT infrastructures. It also helps businesses and the government respond more rapidly to attacks, he said.

The IT-ISAC is the fourth such private-sector alliance to he formed, joining similar initiatives in the banking, electricity and telecommunications industries. The establishmeot of the technology industry alliance comes more than two years after the Clinton administration first urged companies to join the government in efforta to protect critical infrastructure from both physical attacks and cyberattacks.

Mineta, a former CEO of Bethesda, Md.-based Lockheed Martin Corp., called the commitment to information sharing "a very courageous thing to do" on the part of the 19 founding companies.

"The last thing that a corporate executive wants to do is share information about his own company with the competition," said Mineta, who has been nominated by George W. Bush to take over as the next secretary of transportation.

In addition to legislation that has been introduced in Congress that would make proprietary data shared by companies with the governmeot exempt from the Freedom of Information Act, the national security community is working to develop trusted paths for exchanging sensitive and classified information.

Richard Clarke, national coordinator for security, infrastructure protectioo and counterterrorism at the National Security Council, said there's no reason why the government can't share classified information on cybersecurity with the IT-ISAC. The initiative is "a key element of the government's cooperation with industry," he said.

The IT-ISAC is "the first step to real change" in sharing security-related information more widely, said Tim Atkin, a security consultant at SRA International Inc. in Fairfax, Va., and a member of the federally organized National Partnership for Critical Infrastructure Protection. But, he added, the initiative's success will he measured by the number of companies that agree to participate. ▶

AT A GLANCE

IT-ISAC

The Team: 19 founding members from the hardware, software, e-commerce and security industries, including AT&T, Cisco, IBM, Intel, Microsoft and Oracle

The Mission: Monitor and exchange information on potential and known threats and vulnerabilities to corporate and government computer systems

The Reason: National cybersecurity is the one national security challenge that the federal government doesn't have the expertise or the resources to combat on its own

How It Will Work: Internet Security Systems will operate the IT-ISAC and will share warning and threat information with federal law enforcement and possibly intelligence officials, as called for

MORE THIS ISSUE
To learn more about ISACs and measures against cyberwarfare **see page 44.**

Continued from page 1

China

gaining technical information, the report states.

But representatives from companies with major operations in China said they have never had problems and doo't plan to run scared now.

"I would discount most of the alarmist reports," said David Blumental, a corporate lawyer at the law firm of Vinson & Elkins in Houston who has represented numerous firms doing business in China.

"The real focus of their control efforts is what the Chinese call 'black and yellow,' or political and pornographic material," said Blumental. "How serious an issue [economic espionage] is depends on who you are and what business you're in." And it isn't unique to China, he added.

Philip Leung, vice president of the American Chamber of Commerce in Hong Koog, also expressed doubts.

"I am not convinced that the Chinese government is overtly — or, for that matter, covertly — engaging in corporate espionage via the Internet," said Leung.

Yet U.S. intelligence experts interviewed by *Computerworld* say China's vast intelligence-collecting apparatus has a voracious appetite for any U.S. technology that could help speed the People's Republic's military modernizatioo and boost the country's economy. That puts high-tech vendor companies particularly at risk.

"Businesses operating in China are up against a national government that has essentially unlimited resources and a long track record of industrial and economic espionage," said one intelligence official.

"Every business in China is ruo by the government, and any effort to develop intelligence and promote those industries is a national effort," said Peter Gasper, a senior geopolitical analyst at Logi-Keep and principal author of the report. He added that scans, probes and attacks against U.S. firms in China "are statistically confirmed and growing" and could he Chinese tests of offensive informatioo warfare tactics or the work of Chinese virus writers.

The U.S. firms that may he at the greatest risk of losing proprietary data include companies that have set up development laboratories in China, said Gasper. But those companies, eager to gain a foothold in China's burgeoning IT market, doo't necessarily share the fears of intelligence experts.

Play by the Rules

Rosemary Yaecker, a spokeswoman for Murray Hill, N.J.-based Lucent Technologies Inc., which signed a $15 million deal this month with China's Liaoning Telecom for Lucent's optical networking products, said there are no barriers to doing business in China for companies that know the rules and abide by that nation's laws.

Fred P. McNeese, a spokesman for IBM Asia-Pacific, said IBM "believes appropriate safeguards are in place in China and elsewhere."

Patrick McGovern, chairman of the board of Boston-based International Data Group, the parent company of *Computerworld*, has played an instrumental role since 1980 in opening up China's markets to U.S. companies. He said he sees a China that's becoming less centralized.

"Our operations in China are indistinguishable from any of the 84 countries where we operate," said McGovern, whose company also owns a venture capital operatioo that has invested in more than 100 Web-based firms in China. "We've never had any problems with the Chinese government restricting what we were doing or any incidents where proprietary information was lost."

Leung acknowledged that there are more controls in place in China than in some other countries, but he said he doesn't believe they have been put in place to foster espionage. "While the Chinese view controls and regulations as necessary to facilitate an orderly Internet market and to protect the country from subversion . . . and other Internet crimes, I believe the controls are partially the result of political rigidity and bureaucratic inertia," he said.

"Human nature is the same everywhere in the world," said McGovern. "The thought that there are lots of people with time on their hands to explore what the 20 million Internet users in China are doing is totally impractical." ▶

Periodical postage paid at Framingham, Mass., and other mailing offices. Posted under Canadian International Publication agreement #0385697. CANADIAN POSTMASTER: Please return undeliverable copy to PO Box 1632, Windsor, Ontario N9A 7C9. Computerworld (ISSN 0010-4841) is published weekly, except a single combined issue for the last two weeks in December by Computerworld, Inc., 500 Old Connecticut Path, Box 9171, Framingham, Mass. 01701-9171. Copyright 2001 by Computerworld Inc. All rights reserved. Computerworld can be purchased on microfilm and microfiche through University Microfilms Inc., 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Computerworld is indexed. Back issues, if available, may be purchased from the circulation department. Photocopy rights: permission to photocopy for internal or personal use is granted by Computerworld Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3 per copy of the article, plus 50 cents per page, is paid directly to Copyright Clearance Center, 27 Congress St., Salem, Mass. 01970. Reprints (minimum 100 copies) and permission to reprint may be purchased from Ray Trynovich, Computerworld Reprints, c/o Reprint Management Services, Greenfield Corporate Center, 1811 Olde Homestead Lane, Lancaster, Pa. 17601 (717) 399-1900, Ext. 124. Fax (717) 399-8900. Web site: www.rmsreprints.com. E-mail: [illegible]@rmsreprints.com. Requests for missing issues will be honored only if received within 60 days of issue date. Subscription rates: $5 per copy; U.S. – $58 per year; Canada – $[illegible] per year; Central & So. America – $250 per year; Europe – $295 per year; all other countries – $295 per year. Subscriptions call toll-free (800) 552-4431. POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, PO Box 512, Mount Morris, Ill. 61054-0512.

FRANK HAYES/FRANKLY SPEAKING

Unsafe at Any Speed

THE FBI JUST ANNOUNCED that in December, it broke up an international ring of teen-agers who had bragged that their goal was to "take down the Internet" on New Year's Eve. Four kids were arrested in Israel, and others in California, Michigan and Washington state had their PCs confiscated and are still under investigation.

Yeah, right, you're thinking — how likely is it that a handful of juvenile delinquents could really shut down the entire Internet? Not very. But how likely is it that a bunch of kids could wreak millions of dollars' worth of havoc? That would be almost routine.

Until a dozen years ago, nobody even thought that taking down the Internet was possible. In November 1988, it took a bona fide Unix expert — Cornell University graduate student Robert Morris Jr. — to create a self-replicating worm program that brought the Internet to its knees.

Now, 16-year-olds try it to impress their friends.

What happened? You'd think that after 10 years of working to make the Internet secure and safe for business, we'd be looking at a solid, stable platform instead of staring into the face of Armageddon with acne.

Sure, part of the problem is that over the past decade, the tools for attacking the Internet have gotten infinitely more sophisticated and easier to use. These days, any script kiddie with an Internet account and a few garden-variety hacking tools taken off the Web can crank out worms, macroviruses and Trojan horses by the yard.

The Internet has grown more fragile over the past 10 years.

But it's also true that the Internet has grown more fragile over the past 10 years. Fragile? Sure. Today the Internet is piled high with undermaintained servers full of security holes. Their owners — dot-coms and ISPs and even some corporate IT shops — are more worried about shaving the costs of running them than about staving off security risks.

Those are the systems that script kiddies target with their mutating e-mail viruses and domain-name redirection scripts and distributed denial-of-service attacks. They can barely keep running under the best of conditions, much less withstand a clever cracker's exploit.

And when those systems crack, they make the Internet a dangerous neighborhood for everyone else.

Oh yeah, and there's one other thing that's created this let's-bring-down-the-Net attitude: us. Face it, just by being there, corporate Web sites present a challenge to any kid with a political agenda or bad attitude or just too much time on his hands.

Once, that challenge would have required dedication for a would-be cracker to just figure out how to make contact with our systems. Now, thanks to the Internet, he can collect the details of our servers in seconds.

And we're stuck. There's not much we can do about hacker tools and script kiddies. And there's no way to retreat to our old corporate networks. We need the Internet so our salespeople can get to customers and our inventory systems can contact our supply chains — so our users can get their jobs done. Being giant targets is our only option.

But at least we can be giant *moving* targets. So keep reading the security alerts and applying the patches and tuning the firewalls and haranguing the users to kill suspicious e-mail instead of opening it.

And if the CEO grumbles about the security budget, remind him that there's nothing as dangerous as a 16-year-old who thinks he knows everything — including how to shut you down.

And take heart: International conspiracy of teens or no, you'll probably never have to worry about hackers taking down the whole Internet.

Just your little corner of it. ▮

Hayes, Computerworld's senior news columnist, has covered IT for more than 20 years. Contact him at frank_hayes@computerworld.com.

SHARK TANK

GOING DOWN? Network pilot fish is doing a router upgrade and needs to figure out which wires are live on the network. He sends e-mail asking everyone working on the second floor to leave their computers on and connected to the network. But he's unprepared for the flood of replies from people asking what floor they work on. Says the amazed fish, "I told them to go by what the elevator said."

MESSAGE RECEIVED This e-mail showed up at a jewelry company's IT help desk: "Hi guys, I've been trying to send and receive e-mails and it's not working. Can you help me? Thanks. . ."

UNIX CONSULTANT pilot fish walks a customer through the process of backing up a new server to 8 mm tape, so he can assume sysadmin duties. A few weeks later, fish gets a call: The newbie sysadmin says he can't use the last of his tape cartridges – "the device rejects it shortly after it's loaded," he says. Fish ponders a moment before asking, "Does the tape say 'cleaning cartridge' on it?"

STORAGE MANAGEMENT pilot fish recalls the days of converting from round reels of tape to 3,480 tape cartridges – and trying to explain the difference to a computer operator. "I explained that instead of writing at 6,250 BPI, we'll be writing at 38,000 BPI." "Wow," says the impressed operator, "those suckers are really going to be heavy."

LAPTOP USER asks help desk pilot fish if his files will fit on floppy disks. As long as they're smaller than 1.4MB per file, you'll be fine, says the fish. Not long after, user calls to complain that the files won't fit. Bigger than 1.4 meg? the fish asks. "They aren't any meg at all, they're just K," indignant user says. "How many K?" fish asks. User replies, "1,600."

SYSTEMS ANALYST at a small hospital can't resist personally checking out a user's complaint that a PC is broken. The mysterious-sounding symptom: "It doesn't make that spaceship noise anymore." Diagnosis: "Someone from housekeeping inadvertently unplugged the modem line to gain access for a vacuum cleaner," says the fish. And the spaceship? "She was referring to the noise a modem makes when connecting."

Forget the modem and shake hands with the shark: **sharky@computerworld.com.** You get a snazzy Shark T-shirt if your true tale of IT life sees print – or if it shows up in the daily feed at *computerworld.com/sharky*.

The 5th Wave

E-mail richtennant@the5thwave.com

"I don't know what program you been usin' Frank, but it ain't the right one. Look–your menu bar should read, File, Edit, Reap, Gather..."